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Alaska State Office
222 West 7th Avenue, #13
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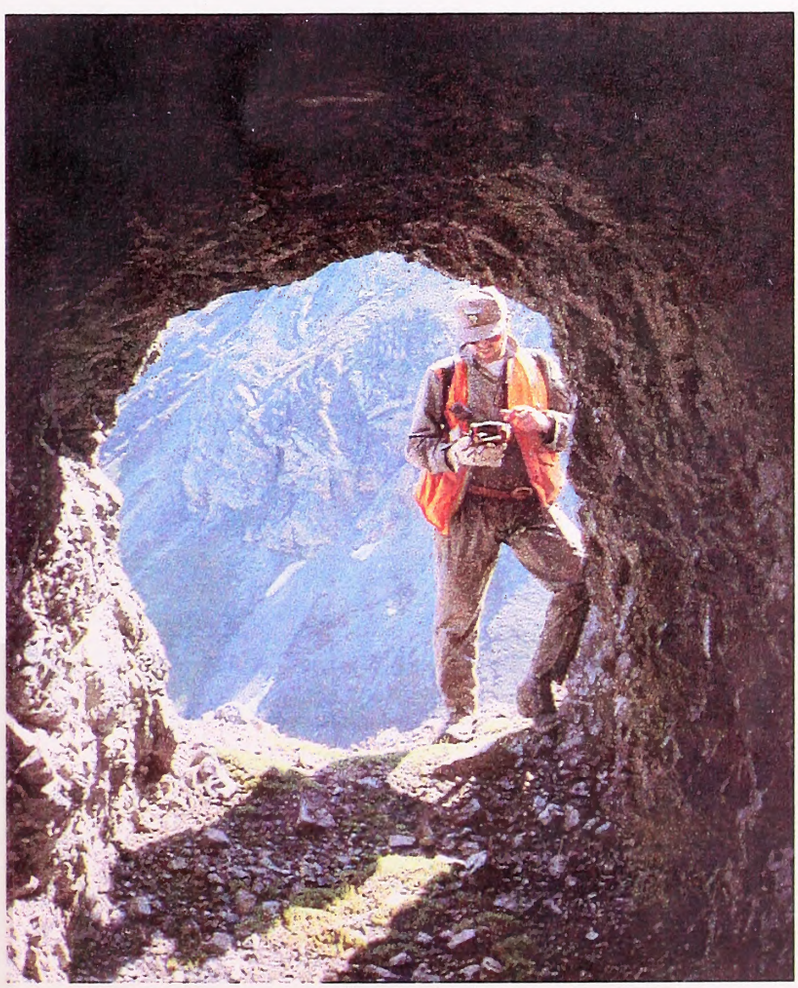
Mineral Assessment of Ahtna, Inc. Selections in the Wrangell-St. Elias National Park and Preserve, Alaska

1998 Preliminary Report

Mark P. Meyer and
Darrel A. VandeWeg



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Authors

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Cover photo

Darrel A. VandeWeg collecting GPS location data at the Cave Prospect Adit No. 2 on Copper Creek, a southern tributary of the Kotsina River. Photo by Mark P. Meyer.

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ABSTRACT

During 1998, the Bureau of Land Management conducted the second year of field work in a multi-year mineral assessment of Ahtna, Inc. Regional Native Corporation, Alaska Native Claims Settlement Act (ANCSA) selections within the Wrangell-St. Elias National Park and Preserve, Alaska. The assessment is being conducted to provide Ahtna, Inc. with minerals information to assist them in finalizing their land selections within the park.

Work during the 1998 field investigation was conducted in the southern Wrangell Mountains area. Twenty-nine properties were located and of those properties samples were collected at 24 of them. Four properties were revisited but not sampled. Twelve reported occurrences were looked for but not located; the surrounding area was sampled on 4 of them.

Seventeen properties with significant levels of copper along with anomalous levels of silver and/or gold were located during 1998. Of these, nine properties are located inside the selection boundaries and include the Barrett Young and Nafsted, Fall Creek Saddle Occurrence, Fall Creek Upper Prospect, Larson, Lime Creek, Mineral Creek, Newhome, Sunrise, and Sunset prospects. Eight properties are located outside of the Ahtna, Inc. selections; these include the Divide Creek, Forget-Me-Not, Minneapolis, Mountain Sheep, Roaring Creek, Surprise/Sunshine, and Warner prospects and the Nugget Creek Mine. Metal values of select samples collected at the properties range up to 24.03% copper, up to 61.5 ppm silver, and up to 2.9 ppm gold. Native copper was found at the Homestake, Roaring Creek, and Sunset prospects. Bornite, chalcocite, chalcopyrite, malachite, azurite, and/or pyrite minerals were found, in various concentrations, at all of these properties.

Seven properties evaluated during 1998 have been patented. These include the Copper King, Hubbard-Elliott, Mullen, and Nugget Creek mines and the Franklin, Minneapolis, and Warner prospects.

INTRODUCTION

In 1996, the U.S. Department of Interior National Park Service (NPS) asked the Bureau of Land Management (BLM) to provide comprehensive minerals information and conduct mineral assessments on federal lands selected by Ahtna, Inc. Regional Native Corporation (Ahtna, Inc.) based in Glennallen, Alaska. The selections occur within the central to northwestern part of the Wrangell-St. Elias National Park and Preserve, Alaska. BLM has the authority to conduct Mineral Assessment activities under section 1010 of the Alaska National Interest Lands Conservation Act (ANILCA).

In 1998, field work was continued to follow up on the work completed during 1997 in the southern part of the Wrangell-St. Elias National Park and Preserve to further identify the number, type, amount, distribution, and development potential of mineral deposits located on and adjacent to Ahtna, Inc. lands within the park boundary. In the southern Wrangell Mountains area, 60 mineralized properties have been identified in association with the Ahtna, Inc. selections. Included are properties located within a 1 to 3 mile radius of the Ahtna, Inc. selected lands, which occur close enough to be considered important to this mineral assessment. Of those 60 properties, 7 were historically producing mines, 43 are development prospects, 8 are exploration prospects, and two are 2 are raw prospects. Historically producing mines include the Berg Creek, Clear Creek, Copper King, Hubbard-Elliott, Mullen, Nugget Creek, and Silver Star mines. Fifty-seven of the properties are lode deposits with the remaining 3 being placer deposits.

During the three-week 1998 field investigation attempts were made to locate 45 properties. Twenty-four of those properties were located and sampled, 5 located but not sampled, 4 were revisited, 4 were not located but the surrounding area sampled, and 8 could not located. Seventeen properties were identified and contain significant mineral concentrations. Of these, nine are located inside the Ahtna, Inc. selection boundaries and include the Barrett Young and Nafsted prospect, the Fall Creek Saddle Occurrence, the Fall Creek Upper Prospect, the Larson prospect, the Lime Creek prospect, the Mineral Creek prospect, the Newhome prospect, the Sunrise prospect, and the Sunset prospect. Eight properties were located outside the selection; these include the Divide Creek prospect, the Forget-Me-Not, the Mountain Sheep prospect, the Minneapolis prospect, the Nugget Creek Mine, the Roaring Creek prospect, the Surprise/Sunshine prospect, and the Warner prospect.

LAND STATUS

Land in the study area is situated within the Wrangell-St. Elias National Park and Preserve. The park was established and included in the National Park System in 1980 as part of ANILCA, Title II, Section 201(9). Located within the park are 650,000 acres Ahtna, Inc. selected under the authority of the 1971 Alaska Native Claims Settlement Act (ANCSA), Section 12(c). Other native selections include selections made by the local village corporations under ANCSA authority, as well as individual native allotments granted under the Native Allotment Act of 1906. There are also numerous private and State of Alaska inholdings and rights-of-way occurring within the park boundary.

Currently, there are no active unpatented mining claims located within or adjacent to the Ahtna, Inc. selections in the southern Wrangell Mountains. Nine properties have been patented. These include the Clear Creek Mine, the Copper King Mine, the Franklin prospect, the Hubbard-Elliott Mine, the Mullen Mine, the Minneapolis prospect, the Nugget Creek Mine, the War Eagle prospect, and the Warner prospect.

LOCATION AND ACCESS

The Wrangell-St. Elias National Park and Preserve is located in southcentral Alaska (Plate 1). The park is the largest national park in the United States encompassing all or parts of the Wrangell and Nutzotin Mountains to the north and the Chugach and St. Elias Mountains to the south. The main park headquarters is located at mile 105.5 on the Old Richardson Highway near Copper Center, Alaska. Satellite ranger stations include the Chitina Ranger Station at Chitina, the Nabesna Ranger Station at Slana, and the Yakutat Ranger Station at Yakutat.

ANILCA established the park that encompasses 8.33 million acres designated as park and 4.85 million acres designated as preserve, for a total of 13.18 million acres. Wilderness designations within the park, also established by ANILCA, encompass an area of 8.7 million acres. The 1998 study area covered approximately 321,000 acres on the southwestern side of the Wrangell Mountains, mainly in the Kotsina and Kuskulana River drainages. Access to the study area is along the Edgerton Highway which is connected to the Richardson Highway, a part of the Alaska Highway system. A helicopter was used to access the mineralized properties from the base camp at the Kenny Lake Mercantile located in Kenny Lake, Alaska, mile 7.5 of the Edgerton Highway. To minimize impacts within the park, helicopter landing sites were selected to be either as close as possible to mineralized localities and sample location sites, or so that the maximum number of locations could be visited from each landing site.

ACKNOWLEDGMENTS

The authors would like to thank Danny Rosenkrans, Geologist, and Geoffrey T. Bleakley, Historian, Wrangell-St. Elias National Park and Preserve, Copper Center, Alaska, for historical information; Mike Wood, pilot, Air Logistics of Alaska, Inc., Fairbanks, Alaska; and Mike Hanscom, Hubbard-Elliott Mine co-owner, for allowing us to visit his property on Elliott Creek.

We would also like to thank Susan Winingham, owner of the Kenny Lake Mercantile, as well as all her assistants at the Kenny Lake Cafe for their gracious hospitality and good cooking.

GEOLOGY

The 1998 study area covers the southwest part of the Wrangell Mountains. The area includes Paleozoic and Mesozoic rocks that are part of Wrangellia, a tectonostratigraphic terrane that originated far to the south and has been tectonically rafted north to its present position (Richter, written communication, 1998).

The southern Wrangell Mountains area is characterized by a low-lying, broad valley, the Chitina River Valley, that separates the steep mountainous terrain of the southern Wrangell Mountains from that of the Chugach Mountains. The Border Ranges Fault, that transects the Chugach Mountains, forms the southern end of the study area The oldest rocks belong to an upper Paleozoic volcanic arc, the Skolai Arc which apparently developed on an ancient oceanic crust. The arc is overlain by thick sequences of upper Paleozoic and Mesozoic sedimentary rocks with both the arc and younger rocks being intruded by Mesozoic and Cenozoic plutons and dikes. Early Cenezoic Wrangell Lava unconformably overlies all older rocks. The early Mesozoic Nikolai Greenstone and the Chitistone Limestone, which locally host significant mineral deposits in the Wrangell Mountains, are present throughout much of the study area (Richter, written communication, 1998).

Numerous rock units have been recognized in the southern Wrangell Mountains area. The oldest is the Skolai Group which is subdivided into the Station Creek Formation and the Hasen Creek Formation. The Lower Permian and

Pennsylvanian Station Creek Formation is composed of a submarine volcaniclastic member and a volcanic flow member. The volcaniclastic member is up to 2,600 ft. thick. It ranges from thin-bedded to massive with an upward gradation from coarse volcanic breccia through volcanic graywacke to volcanilutite. The volcanic flow member is up to 4,000 ft. in maximum thickness. This member is composed of andesites, basalts, and minor intercalated volcaniclastic rocks. The flows are locally pillowed and brecciated and have been weekly metamorphosed, locally to albitite. These formations are in fault contact with either a thick complex of interlayered gneiss and gabbro or layered gabbro of Pennsylvanian age (MacKevett, 1978).

The Lower Permian Hasen Creek Formation conformably overlies the Station Creek Formation. This formation is composed of diverse thin-bedded sedimentary rocks that have been weekly metamorphosed and range up to 2,000 ft. thick. It includes argillite, graywacke, shale, chert, limestone, and minor conglomerate. The unit has been cut by Triassic gabbro and occasionally Jurassic or Tertiary intrusive rocks. Limestone in the upper part of the formation is thick enough, up to 800 ft., to be cartographically mapped. It ranges from thin to thick bedded and is highly fossiliferous (MacKevett, 1978).

Unconformably overlying the Skolai Group is the Upper and/or Middle Triassic Nikolai Greenstone. The Nikolai Greenstone is composed of dark green, coarse-grained, amygdaloidal basalt flows which have undergone extensive chemical alteration. The basalt flows range from 6,500 to 7,000 ft. thick with the Nikolai Greenstone and the Skolai Group combined totaling from 13,500 to 14,500 ft. thick (Moffit and Mertie, 1923). The greenstone is commonly cut by dikes and sills of the Jurassic Chitina Valley batholith and epizonal Tertiary plutons (MacKevett, 1978).

The Upper Triassic Chitistone and Nizina limestones lie disconformably over the Nikolai Greenstone. The lower Chitistone Limestone section is massive, showing little to no evidence of stratification, and creates excellent cliff faces while the upper Nizina Limestone section is conspicuously dark, thin-bedded and grades seamlessly into the overlying McCarthy Formation. The Chitistone Limestone ranges up to 2,000 ft. thick and grades upward into the Nizina Limestone. The lower part of the Chitistone contains abundant dolomite, algal-mat chips, and intratidal to supratidal features while the upper part contains diverse limestones including lime mudstone, wackestone, packstone, grainstone, and minor chert nodules. The Nizina Limestone, up to 1,500 ft. thick, consists of diverse limestones containing chert as nodules, lenses, and coalescing masses in its lower section while noncarbonate detritus is found in its upper section. The Nizina was formed in deeper water than the Chitistone. Both sections are known to emit fetid odors when freshly broken. Jurassic (Chitina Valley batholith) and Tertiary plutons cut and intrude both limestones (Moffit and Mertie, 1923 and MacKevett, 1978). The Chitistone and Nizina limestones are probably correlated to the Triassic Nabesna Limestone located in the northern Wrangell Mountains area (MacKevett, 1978). Where the Chitistone and Nizina limestones are adjacent to the Chitina Valley batholith the limestones have been metamorphosed to marble. It is typically fine- to medium-grained calcite-rich, locally dolomitic and occasionally crudely schistose or banded (MacKevett, 1978).

Limestones of the Lower Jurassic and Upper Triassic McCarthy Formation consist of the lower and upper members. This formation is composed of a 3,000 ft. thick section of shale and thin-bedded, yellowish brown to grayish brown weathered limestones. The upper member is composed of 2,000 ft. of impure limestone, impure chert, and shale which is gradational into the lower member. The upper member is confined to the vicinity of McCarthy Creek. The lower member is more wide spread and is

composed of 1,000 ft. of thin-bedded impure limestones, calcareous carbonaceous shale, and impure chert overlying the Chitistone Limestone. In some areas the transition zone between the two members is missing, while elsewhere, it reaches thicknesses of several hundred feet. This formation shows more pronounced deformation and folding than of the other rock units in the southern Wrangell Mountains area, due to its relative weakness. The formation has been cut and intruded by plutons of the Jurassic Chitina Valley batholith and Tertiary dikes (Moffit and Mertie, 1923 and MacKevett, 1978).

Unconformably overlying the lower member of the McCarthy Formation is the Upper to Middle Jurassic Kotsina Conglomerate. Waterworn pebbles and cobbles inclosed in a shaly or arkosic matrix make up the conglomerate. Derived from the Triassic limestones, Nikolai Greenstone, and the Skolai Group and also include granodiorite, dike rock, chert, and quartz. These greenish gray conglomerates form rugged topographic features, can reach thicknesses of 1,000 ft., and weathers to a brown color (Moffit and Mertie, 1923, MacKevett, et. al., 1978).

Lower Cretaceous sedimentary rocks overlie the older rocks by a marked angular unconformity, creating a sequence up to 1,500 ft. thick. The sequence is made up of sandstone, shale, abundant impure bioclastic limestone, and conglomerates cut by Tertiary plutons (MacKevett, 1978). These rocks have been subdivided into the Berg Creek Formation and the Kuskulana Pass Formation (MacKevett, et. al., 1978). The Berg Creek Formation unconformably overlies Triassic rocks, nonconformably overlies the Jurassic Chitina Valley batholith, and grades upward into the Kuskulana Pass Formation. The formation is up to 800 ft. thick showing bold outcrops and is massive to medium bedded and occasionally cross-bedded. It consists of light gray to yellowish brown bioclastic sandy limestone and a basal, 100 ft. thick, greenish gray to buff colored pebble conglomerate (MacKevett, et. al, 1978).

The Kuskulana Pass Formation is a 1,000 ft. thick unit forming smooth to moderate slopes underlying the Kennecott Formation. It consists of dark greenish to medium gray thin-bedded and fine-grained sandstone, siltstone, and shale that weathers to a brown color (MacKevett, et. al., 1978).

The majority of the aforementioned rock units have been intruded by igneous rocks, particularly the Skolai Group. The intrusions include pyroxene diorite, gabbro, granodiorite, quartz diorite, quartz diorite porphyry, and/or quartz latite of the Jurassic Chitina Valley batholith or Tertiary plutons. Dikes and sills are common in portions of the limestones (McCarthy Formation) but not in the Chitistone and Nizina limestones or the Kotsina Conglomerate (Moffit and Mertie, 1923). Folding and faulting has occurred in all these rock units with the most intensive activity occurring below the Kotsina Conglomerate. Thrust faulting is the most common form of displacement in the Kotsina-Kuskulana area (Moffit and Mertie, 1923 and MacKevett, 1978). Metamorphism has occurred within the Skolai Group and Nikolai Greenstone producing schistose structures (Moffit and Mertie, 1923).

MINERAL RESOURCES

Mineral resources in the southern Wrangell Mountains study area include copper, gold, silver, molybdenum, and reported uranium (Meyer and Shepherd, 1998). They are related to the mafic intrusive, ultramafic, and granitic rocks in contact and intruded into sedimentary and mafic volcanic terrane as shown on Plate 1. Copper, the most abundant resource, is found in porphyry, stockwork, contact metamorphic, vein, and volcanogenic deposits. Gold and silver are found as byproducts of the copper porphyries, as well as in contact metamorphic, disseminated, and stockwork deposits. Gold is also found in placer deposits. Molybdenum occurs in small quantities as a byproduct of the copper mineralization (MacKevett, et al., 1977). Mining claims were staked for uranium in the Kotsina

River drainage during the mid 1950's, but an occurrence has not been substantiated (Meyer and Shepherd, 1998).

COPPER DEPOSIT TYPES

Moffit and Mertie (1923) described in detail, the copper deposits found in the southern Wrangell Mountains in what they identified as the Kotsina-Kuskulana district. Two types of copper deposits were identified, stringer lode and contact deposits. Stringer lodes, the more common type, occur in either shear zones along fault planes or in fractures and are locally deposited in the country rock. Contact deposits, on the other hand, consist of disseminated and localized bodies of mineralized rock at or near the contact with granodiorite plutons. The most common host rock for the mineralization is the Nikolai Greenstone, but the upper part of the Skolai Group also hosts mineralization. The lower part of the Chitistone Limestone is also known to locally contain copper mineralization (Moffit and Mertie, 1923).

Copper minerals associated with stringer lode deposits include native copper, chalcocite, bornite, chalcopyrite, cuprite, covellite, malachite, azurite, and occasionally chalcanthite. Other minerals may include native silver, gold, native bismuth, barite, galena, and pyrite. Minerals associated with contact deposits include disseminated pyrite and chalcopyrite. Locally, contact-metamorphic minerals including garnet, magnetite, pyroxene, and hornblende may be present in small amounts. The source of the copper is generally believed to be from either the Nikolai Greenstone and/or from magmatic solutions discharged from the underlying granodiorite intrusions (Moffit and Mertie, 1923).

Examples of stringer lode deposits are located in the Canyon Creek, the Kotsina River, and the Kuskulana River drainages. These include the Copper King, Hubbard-Elliott, Mullen, and the Alaska Copper mines and the Bunker Hill, Cave Prospect, Divide Creek, Fall Creek Saddle Occurrence, Fall Creek Upper Prospect, Falls Creek, Forget-Me-Not, Franklin, Hidden Treasure, Homestake, Kinney-Golden, Larson, Lime Creek, Lost Cabin, Mineral Creek, Montana Boy, Mountain Sheep, Newhome, Skyscraper, Sunrise, Sunset, Surprise/Sunshine, and Warner properties.

Examples of contact deposits are located in the Kuskulana River drainage. These include the Berg Creek Mine and the Copper Queen, London and Cape, Porcupine Creek, and War Eagle properties.

GOLD DEPOSITS

Gold has only been found in sufficient quantities to warrant exploration at a few locations in the southern Wrangell-St. Elias study area. Generally it has only been given secondary consideration as a byproduct of the copper mineralization. Associated minerals include pyrite and chalcopyrite. Gangue materials include quartz and calcite (Moffit and Mertie, 1923). Properties where gold is considered valuable or as the primary commodity include the Berg Creek, Copper King, and Hubbard-Elliott mines as well as the Carmalita and Dottie placer prospects.

HISTORY

Native copper from the region had been utilized by the indigenous residents of the lower Copper River for centuries. It was not only fashioned into hunting tools and ornamentation but also used as trading material with other Alaskan native groups. Having this copper resource gave the Ahtna natives prestige and power, which enhanced their position as traders between the natives to the south and those to the north. Most of the native copper was likely recovered from stream gravels, but evidence suggests that some may also have been mined from several outcrops throughout the valley (Bleakley, unpublished).

During the late eighteenth to the middle nineteenth centuries the Russians spent minimal effort in exploring the Copper River region for its mineral wealth. Dmitri Tarkhanov accomplished a small amount of exploration in 1796 along the Copper River, but he never traveled as far north as the Chitina River. Even after the United States purchased Alaska from the Russians in 1867, it wasn't until the early 1880's that the Americans really began exploring Alaska. The first mineral prospecting didn't occur until 1884 when John Bremner explored the lower Copper River (Bleakley, unpublished).

Serious exploration activity in the Wrangell Mountains began as a result of the influx of prospectors and miners during the 1898 Klondike "Gold Rush". This area was located along an alternate western route of the "Gold Rush Trail" between Port Valdez and the Yukon Territory. Numerous prospectors, weary from the adventure over the Tazlina Glacier, scoured the valleys and ridge tops of the Wrangell Mountains looking for the elusive "Mother Lode". Others only stopped to check out the mineralization en route to the greater riches hopefully awaiting them at Dawson and beyond. A few successful prospectors began mining their deposits for gold, copper, and silver, with the Kennecott Mine being the most notable success. Less notable but important discoveries were made by Hubbard and Elliott on Elliott Creek, Olé Berg on Berg Creek, the Great Northern Development Co. on Clear Creek, the Alaska Consolidated Copper Co. on Nugget Creek, and the numerous prospects located on Copper Creek.

Most of the mining activity in the region ceased by the mid to late 1930's, either due to the ore being exhausted or from low mineral prices. During World War II mining activities in the United States that were deemed unnecessary for the war effort were closed down by executive order. A second flurry of mineral exploration occurred in the mid to late 1950's, but no significant development or mining occurred during this period. Part of the reason was that the wages offered to the miners was less than what the government was paying construction workers throughout the state (verbal communication with Kirk Stanley). Though no mining has occurred at the Nabesna Mine since 1946 (Meyer and Shepherd, 1998), exploration and development activity has continued to occur at the Nabesna, Royal Development Co., and Rambler mines as well as several other occurrences in the region during recent years. Exploration activity in the southern area has continued to occur on smaller properties but none of this activity has occurred on Ahtna, Inc. selections.

A detailed historical account of the copper and gold mining and exploration activities in the Wrangell Mountains, not associated with the Kennecott Mine, is being written by Geoffrey Bleakley, the park Historian for the Wrangell-St. Elias National Park and Preserve.

PREVIOUS STUDIES

The Wrangell Mountains were first explored for their mineral potential by the U.S. War Department in 1885. Lt. Henry T. Allen reached the headwaters of the Chitina and Nizina Rivers looking for the source of Chief Nikolai's copper (Allen, 1887). In 1891, Charles W. Hayes was the first USGS geologist to explore and discover many of the copper deposits in the area (Hayes, 1892). Rohn (1900) conducted the first true geologic and mapping exploration program of the area for the War Department in 1899. The USGS began earnestly conducting studies and reporting on the geology and mining activities of the Wrangell Mountains area beginning in 1898 (Brooks, 1900 and Capps, 1915). Detailed Alaska Mineral Resource Assessment Program (AMRAP) studies, headed by MacKevett, Richter, and Winkler of the USGS, have been conducted on the Nabesna, McCarthy, and Valdez quadrangles. These studies include the publication of geochemistry data, mineral resource data, and geologic maps. See the bibliography section for a listing of those reports.

The U.S. Bureau of Mines (USBM) conducted a two-year reconnaissance mineral assessment of the southern Wrangell-St. Elias area in 1977 and 1978 (U.S. Bureau of Mines, 1978). Only three of the occurrences visited during the USBM study are located within Ahtna, Inc. selected lands. None of the analytical records have been located for samples collected during that study.

PRESENT STUDY

BLM started this multi-year mineral assessment of Ahtna, Inc. selected lands in 1997. An initial literature search identified 74 mineral occurrences located within 1 mile of the Ahtna, Inc. selections. Fifty-five properties were considered important enough to be investigated (Meyer and Shepherd, 1998). After the second year of field work, 79 mineral occurrences have been identified within 1 to 3 miles of the Ahtna, Inc. selections and are considered important enough to be included in this mineral assessment. Nineteen of the occurrences are located in the northern Wrangell Mountains and the other 60 occurrences are located in the southern Wrangell Mountains. Eleven of the mineralized occurrences were identified as historically producing mines, 46 as development prospects, 12 as exploration prospects, and 10 as raw prospects.

This mineral assessment project was broken down into two distinct study areas, the northern Wrangell Mountains area and the southern Wrangell Mountains area. During 1997, field work was performed in both the northern and southern Wrangell Mountains study areas (Meyer and Shepherd, 1998). For 1998, field work was only conducted in the southern Wrangell Mountains study area.

Field work during the study consisted of locating or revisiting as many of the workings as possible "on-the-ground." When workings were located site location and elevation data were collected using a Trimble Pathfinder Pro-XL GPS system[1]. Wherever mineralized rock was encountered representative rock samples were collected from the site to determine the character of the deposit and GPS location data was obtained. If an adit was located and open, a cursory mapping program was conducted. This consisted of determining the length and direction of any drifts or crosscuts found. Any unusual or additional findings, such as the location and amount of dynamite or associated building structures, were also noted. Streams with identified placer occurrences were also sampled.

Once the 1997 field work was completed, the information gathered "on-the-ground" was combined with information from the literature search and previous studies. A more comprehensive understanding was developed as to the historical relationships of miners, exploration companies, and specific properties. Property summary sheets were created for each occurrence (Meyer and Shepherd, 1998). Occurrences requiring more detailed work were identified and the 1998 field season was planned. No work had been done prior to this study to verify the "on-the-ground" workings with the those reported in the literature.

1997 Field Work

Field work was performed during two separate periods. Work in the northern Wrangell Mountains area was conducted from June 15 through 28 based out of the End of the Road Bed & Breakfast, Devils Mountain Lodge, Alaska. Work in the southern Wrangell Mountains area was based out of the Kenny Lake Mercantile, Kenny Lake, Alaska, from July 20 through August 1. Site investigations were completed on 26 of the identified mineral occurrences (8 in the northern area and 18 in the southern area). A

[1] Mention of a specific brand name or manufacturer is for information purposes only and does not imply endorsement by the Bureau of Land Management.

total of 37 adits were located and 70 samples collected and analyzed.

In the northern Wrangell Mountains five adits on three properties along with two placer occurrences were examined and sampled. Four occurrences were not located and four were not looked for due to time constraints. A total of 31 samples were collected from the Camp, Caribou, Rock, and Trail Creek areas as well as the White Mountain area. During the 1997 field season no significant mineral properties within Ahtna, Inc. selected lands other than the Nabesna, Rambler, and Royal Development Co. mines were identified. Numerous shear zones were encountered, but the mineral values and the extent of mineralization did not warrant further exploration. The Nabesna and Royal Development Co. mines are patented and a validity determination is proposed on the Rambler Mine by the NPS (Meyer and Shepherd, 1998).

In the southern Wrangell Mountains 32 adits on 18 properties were located and sampled. Sixteen other occurrences were looked for but not located and 3 occurrences were not looked for due to time and weather constraints. A total of 39 samples were collected from the Chichokna, Chokosna, Kotsina, and Kuskulana Rivers and the Falls Creek area. During the 1997 field season 11 properties were found to contain elevated commodity values of copper along with high levels of silver, gold, iron, and/or zinc. These properties are the Clear Creek, Copper King, Mullen, and Silver Star mines and the Ammann Prospect, Bluebird, Cave Prospect, Fall Creek, Hidden Treasure, and Peacock Claim prospects. Four other properties contain lower but still elevated commodity values. These are the Amy Creek, Copper Queen, Larson, and War Eagle prospects. The commodity values of the 11 properties range up to 50.15% copper, up to 1,677.1 ppm silver, up to 9,828 ppb gold, and 4 of the properties contain over 10% iron. Native copper was found at the Homestake adit, whereas, massive chalcopyrite, bornite, and/or chalcocite mineralization were found at the other properties (Meyer and Shepherd, 1998).

SAMPLING

Sampling employed both hard rock and placer sampling techniques. Hard rock sampling included the collection of representative hand specimens and samples for analysis of the mineralized host rocks encountered. All hard rock samples consisted of either select, grab, or chip samples. Select samples were collected of highly mineralized rock, grab samples were collected of random mineral or rock fragments, and chip samples were a collection of either random or representative ore or rock chips taken across or along mineralized outcrops. Sample sizes ranged from 3 to 10 pounds depending upon the quality and quantity of mineralization encountered. Placer samples consisted of running 1/10 of a cubic yard of gravel through a portable sluice box and panning down the concentrates to approximately ½ pound sample size. Each mine, prospect, or occurrence had from one to four individual samples collected, depending upon the extent of the mineralization.

All samples were sent to ITS Intertek Testing Services Bondar-Clegg [1], North Vancouver, B.C., Canada, analytical laboratory for preparation and analysis using 34-element inductively coupled argon plasma spectroscopy (ICP) technique. Any element that was over its ICP detection limit was analyzed by either atomic absorption spectroscopy (AA) or fire assay (FA) techniques. Placer sample concentrates, due to their low amount of free gold, were submitted along with the rest of the samples for lab analysis.

1998 FIELD WORK

During 1998, field work was conducted, in the southern Wrangell Mountains area, from June 7 through 27. The area covers the southwest side of the Wrangell Mountains and includes the Chitina area, from Nelson Mountain

northwest to the Kotsina and Kuskulana River headwaters (Plate 2). This area includes occurrences in the Kluvesna and Kotsina River drainages that were discovered and worked during the early 1900's, concurrent with the Kennecott Mine operation. The major producing operations in the southern area include the Berg Creek, Clear Creek, Copper King, Hubbard-Elliott, Mullen, and Silver Star mines.

Two major drainage basins contain the greatest amount of exploration and development activity in this part of the study area; they are the Kotsina River (which includes the Kluvesna River) and the Kuskulana River. Other areas containing smaller amounts of exploration and development activity included Elliott Creek, Canyon Creek (an eastern tributary of the Copper River) south of Chitina, and the Chokosna River (a northern tributary of the Chitina River).

A total of 26 adits and 24 opencuts were located "on-the ground" and are listed in Table 1. Tables 2 and 3 list the 45 properties that were looked for during 1998. Forty samples were collected and analyzed as a result of the field investigations. See Plate 3 for the sample locations and Appendix A for the analytical results of the 1998 samples. Plate 2 shows the property locations along with Ahtna, Inc. land selections; and Appendix B contains a property summary sheet for each location shown on the plate.

Three of the samples collected contained over 20% copper (the Lime Creek West Adit with 23.99%, the Roaring Creek Adit with 23.02%, and the Surprise/Sunshine Opencut No. 1 with 20.49%), 3 samples contained between 9.56 and 14.48% copper, and 10 samples contained between 1.32 and 3.46% copper. Five samples contained between 10.6 and 61.5 ppm silver, 11 samples contained between 3.1 and 8.9 ppm silver, and 12 samples contained between 0.2 and 2.0 ppm silver. Two samples contained between 2,411 and 2,938 ppb gold, 2 samples contained between 227 and 608 ppb gold, and 21 samples contained between 6 and 98 ppb gold.

Kluvesna River Drainage

The Kluvesna River drainage contains the Fall and Mineral Creek tributaries. Prospects located in the Kluvesna River drainage are found at the Franklin, Lost Cabin, and Mineral Creek prospects. The Lost Cabin prospect is the only property in this area located outside the Ahtna, Inc. selection. The Franklin area was investigated but no workings were located. An outcrop at the base of a waterfall consisted of Nikolai Greenstone with calcite and quartz veins containing disseminated pyrite. A grab sample (map no. 6, sample no. AAWSE 10076) collected of the mineralized rock contained only 186 ppm copper.

An upper adit of the Lost Cabin workings was located and sampled. The lower adit was located from the air, but was inaccessible. The upper adit is driven N. 17° E. for 30 ft. along a shear zone into bedded Chitistone Limestone which has been tipped on edge. A select sample (map no. 9, sample no. AAWSE 10072) collected from the limestone wall rock contained 224 ppm copper, 0.2 ppm silver, and 6 ppb gold. A select sample (map no. 9, sample no. AAWSE 10073) collected from the shear zone contained 253 ppm copper and 0.2 ppm silver.

Workings on Mineral Creek were also investigated but none of the reported adits (Moffit and Mertie, 1923) were located; it appears that most of them have been closed by surface sloughing. Rocks in the entire drainage have been highly sheared and faulted, which has created extremely unstable slopes. Bedrock consists of iron-oxide stained Skolai Group cherts, tuffs, and lava flows which have been intruded by diorite. A 2-ft.-wide shear zone in the diorite contains veinlets and disseminated chalcopyrite and pyrite with quartz gangue. A representative chip sample (map no. 8, sample no. AAWSE 10075) collected across the shear

TABLE 1 - Adit and opencut locations visited in the Wrangell-St. Elias National Park and Preserve

Property name	Latitude	Longitude	Elev (ft.)	Bearing	Length (ft.)	Sample no(s).	Accessibility
Berg Creek Mine Tunnel No. 4	N 61°32'59"*	W 143°47'40"*	2,950	N/A	N/A	Not sampled	Open? not visited
Berg Creek Mine Tunnel No. 5	N 61°33'06.332"	W 143°47'19.801"	2,860	N/A	N/A	Revisited	Caved
Cave Prospect Adit No. 2	N 61°40'20.403"	W 144°04'14.415"	4,350	S78°W	15	10107	Open
Cave Prospect Adit No. 3	N 61°40'11"*	W 144°04'01"*	N/A	N/A	N/A	Not sampled	Open, not visited
Cave Prospect Opencut	N 61°40'25.177"	W 144°04'15.303"	4,400	N/A	30	Not sampled	Open
Copper King Mine Opencut No. 1	N 61°38'20.769"	W 144°02'09.226"	4,610	N/A	N/A	Not sampled	Open
Copper King Mine Opencut No. 2	N 61°38'20.988"	W 144°02'06.649"	4,630	N/A	N/A	Not sampled	Open
Copper King Mine Opencut No. 3	N 61°38'21.053"	W 144°02'06.360"	4,640	N/A	N/A	Not sampled	Open
Copper King Mine Opencut No. 4	N 61°38'21.123"	W 144°02'05.825"	4,640	N/A	N/A	Not sampled	Open
Divide Creek Opencut No. 1	N 61°21'50.655"	W 144°16'37.210"	4,550	N/A	N/A	10102	Open
Divide Creek Opencut No. 2	N 61°21'51.577"	W 144°16'39.436"	4,560	N/A	4	10103	Open
Divide Creek Opencut No. 3	N 61°21'49.080"	W 144°16'40.541"	4,640	N/A	15	10104	Open
Divide Creek Opencut No. 4	N 61°21'49.760"	W 144°16'39.524"	4,575	N/A	N/A	Not sampled	Open
Fall Creek Upper Prospect	N 61°47'48.945"	W 143°56'23.476"	5,270	N/A	15	10087	Open
Falls Creek Adit No. 2	N 61°21'16.925"	W 144°16'14.674"	4,620	S3°W	~100	Not sampled	Open
Falls Creek Opencut	N 61°21'22.103"	W 144°16'11.878"	4,360	N/A	N/A	Not sampled	Open
Forget-Me-Not Opencut	N 61°39'44.673"	W 144°02'09.821"	4,750	N45°W	20	10105	Open
Homestake Adit	N 61°47'31.899"	W 143°56'03.964"	4,640	N65°W	83	Revisited	Open, ice inside entrance
Homestake Opencut	N 61°47'27.733"	W 143°56'12.206"	4,640	N/A	15	10085	Open
Hubbard-Elliott Lower Adit	N 61°39'00.241"	W 144°06'04.936"	3,955	N20°W	N/A	Not sampled	Sloughed at 20 ft.
Hubbard-Elliott Upper Adit	N 61°39'00.946"	W 144°06'06.639"	4,020	N15°W	N/A	Not sampled	Open, one X-cut
Larson West Adit	N 61°42'09.095"	W 143°52'40.919"	4,900	S60°W	25	10096	Partially sloughed at entrance
Larson West Opencut	N 61°42'10.081"	W 143°52'43.894"	4,955	N/A	N/A	10097	Open
Lime Creek Adit	N 61°41'33.004"	W 143°55'56.244"	3,890	N17°W	15	10071	Open
London and Cape Adit	N 61°34'01.141"	W 143°43'06.130"	4,510	S65°E	N/A	10077	Caved

* GPS coordinates could not be differentially corrected. N/A Not available.

TABLE 1 - Adit and opencut locations visited in the Wrangell-St. Elias National Park and Preserve--Continued

Property name	Latitude	Longitude	Elev (ft.)	Bearing	Length (ft.)	Sample no(s).	Accessibility
Lost Cabin Upper Adit	N 61°44'01.510"*	W 143°59'46.135"*	4,010	N73°W	30	10072, 10073	Open
Lost Cabin West Adit	N 61°43'56"*	W 144°00'10"*	3,150	N/A	N/A	Not sampled	Open, length unknown
Mountain Sheep Adit	N 61°40'02.716"	W 144°03'14.675"	4,760	N55°W	10	10106	Caved at 10 ft.
Montana Boy Lower Opencut	N 61°39'45.979"*	W 144°01'56.875"*	5,230	N/A	N/A	10074	Open
Montana Boy Upper Opencut	N 61°39'46.620"*	W 144°01'53.811"*	5,380	N/A	N/A	Not sampled	Open
Newhome Adit	N 61°47'29.965"	W 143°55'50.555"	4,540	N10°E	35	Revisited	Open
Newhome Opencut No. 1	N 61°47'25.124"	W 143°55'59.268"	4,490	N/A	20	10100	Open
Newhome Opencut No. 2	N 61°47'27.785"	W 143°56'01.676"	4,540	N/A	10	Not sampled	Open
Newhome Opencut No. 3	N 61°47'28.186"	W 143°56'01.093"	4,520	N/A	10	10101	Open
Nugget Creek Upper Adit	N 61°38'35.481"	W 143°43'04.669"	3,670	S88°W	25	10079	Caved
Roaring Creek Adit No. 1	N 61°41'17.776"	W 143°50'31.185"	5,290	S36°E	N/A	Not sampled	Caved
Roaring Creek SE Adit	N 61°40'32"*	W 143°49'19"*	4,750	N/A	N/A	Not sampled	Caved
Roaring Creek SW Adit	N 61°40'55"*	W 143°49'57"*	4,650	N/A	N/A	Not sampled	Caved
Skyscraper Adit No. 1	N 61°41'55"*	W 143°48'17"*	5,000	N/A	N/A	Not sampled	Open, not visited
Skyscraper Adit No. 2	N 61°42'06"*	W 143°48'08"*	5,100	N/A	N/A	Not sampled	Open, not visited
Skyscraper Opencut	N 61°42'17"*	W 143°48'05"*	5,100	N/A	N/A	Not sampled	Open, not visited
Skyscraper Peak West Adit	N 61°41'26.417"	W143°48'06.340"	4,790	N56°W	40	10091	Open, partialy sloughed at 20 ft.
Squaw Creek Adit	N 61°33'48"*	W 143°53'44"*	2,750	N/A	N/A	Not sampled	Open, length unknown
Sunrise Opencut No. 1	N 61°47'34.610"	W 143°56'10.733"	4,270	N/A	N/A	Not sampled	Open
Sunrise Opencut No. 2	N 61°47'34.191"	W 143°55'57.940"	4,090	N/A	N/A	10086	Open
Sunset Adit	N 61°47'39.490"	W 143°55'40.296"	4,140	S38°W	N/A	10098	Caved
Sunset Opencut	N 61°47'41.203"	W 143°55'40.887"	4,175	N/A	N/A	10099	Open
Surprise/Sunshine Adit	N 61°45'06.224"	W 143°48'23.982"	5,550	S42°W	100-135	Not sampled	Open, sloughed at 50 ft., dynamite
Surprise/Sunshine Opencut No. 1	N 61°45'07.388"	W 143°48'24.048"	5,640	N/A	20	10093, 10093A	Open
Surprise/Sunshine Opencut No. 2	N 61°45'06.678"	W 143°48'26.481"	5,630	N/A	15	10094	Open
Warner Adit	N 61°42'31.731"	W 143°57'40.373"	2,320	S72°E	30	10070	Open, metal cots and box inside

* GPS coordinates could not be differentially corrected. N/A Not available.

zone contained 1,583 ppm copper, 0.3 ppm silver, and 18 ppb gold.

The Kluvesna River drainage also contains those adits and workings located around Fall Creek which are within the Ahtna, Inc. selection. The Fall Creek area includes the Fall Creek Saddle Occurrence, Fall Creek Upper Prospect, Good Enough, Hidden Treasure, Homestake, Newhome, Sunset, and the Sunrise prospects. The Fall Creek Saddle Occurrence consists of an iron-oxide stained shear zone trending N. 10° W. along the contact of the Nikolai Greenstone and an iron-oxide stained basalt. A select sample (map no. 1, sample AAWSE 10088) collected of disseminated bornite and malachite in the shear zone contained 3,769 ppm copper, 0.6 ppm silver, and 25 ppb gold.

The Fall Creek Upper Prospect is a new location that was located this year. Workings consist of an opencut along a highly iron-oxide stained shear zone within the Nikolai Greenstone. Bornite, chalcopyrite, pyrite, malachite, and azurite occur in epidote and quartz veins within the shear zone. A select sample (map no. 2, sample AAWSE 10087) collected from the shear zone contained 1.94% copper, 6.4 ppm silver, and 6 ppb gold. Mineralization covers a surface area of approximately 30 sq. ft. along strike.

The Good Enough and Hidden Treasure properties were looked for but no workings were located. A possible locality for the Good Enough is just below the waterfall in a gully to the right of the creek at the 3,950 ft. elevation. The Hidden Treasure property was revisited to try to locate the reported underground working (Moffit and Mertie, 1923), but only three cairns were located and GPS data collected on them.

An opencut at the Homestake prospect was located in a gully above the adit located in 1997 (Meyer and Shepherd, 1998). Bedrock consists of iron-oxide stained Nikolai Greenstone with pyrite mineralized quartz veins. A grab sample (map no. 5, sample AAWSE 10085) collected of the pyrite and quartz veins contained 215 ppm copper and 8 ppb gold.

Three opencuts were located on the Newhome property. Opencut No. 1, located the furthest from the adit located in 1997 (Meyer and Shepherd, 1998) to the southwest, is cut along a mineralized shear zone with associated quartz and epidote. Bornite, chalcocite, and malachite occur in the shear, with the bornite surrounding the chalcocite. A select sample (map no. 5, sample no. AAWSE 10100) collected of mineralized rock from the waste dump contained 2.49% copper, 11.6 ppm silver, and 6 ppb gold. Opencut No. 2, located toward the northwest, contained no visible sulfide mineralization. Opencut No. 3 is located directly above the adit. The opencut is cut along a mineralized shear zone with associated quartz veining and may be the same shear as the adit is driven along. Bornite, chalcopyrite, and malachite minerals are deposited in the shear. A select sample (map no. 5, sample AAWSE 10101) collected of mineralized rock from a stockpile contained 2.61% copper, 5.6 ppm silver, and 20 ppb gold.

The Sunrise workings are reportedly (Moffit and Maddren, 1909) located below the Homestake adit. A possible opencut is located at the creek level, but no mineralization was noted. No samples were collected. Further down stream Opencut No. 2 is located on the north side of the stream. bedrock consists of the Nikolai Greenstone which has been intruded by less than 1-in.-thick quartz veins. Disseminated bornite, chalcocite, and malachite are associated with the quartz. A select sample (map no. 4, sample no. AAWSE 10086) collected of the mineralization contained 2.77% copper, 8.9 ppm silver, and 10 ppb gold.

The Sunset prospect is located in the tributary north of the tributary containing the Sunrise prospect. Workings consist of a caved adit and an opencut. The adit appears to be driven S. 38° W. along a 2-ft.-wide shear zone containing native copper, bornite, and malachite with

TABLE 2. - Mineral localities in the McCarthy quadrangle.

Location name	Commodity	Deposit type	Mine type	BLM status - 1998
Barrett Young & Nafsted	Cu	Basaltic Cu	Exp. prospect	Located/sampled
Berg Creek Mine	Au, Ag, Cu	Cu skarn	Past producer	Revisited/not sampled
Blackburn	Cu, Au	Basaltic Cu	Dev. prospect	Area sampled
Carmalita	Au	Placer	Exp. prospect	Area sampled
Chokosna River	Cu	Unknown	Exp. prospect	Looked for/not located
Escape	Au	Placer	Exp. prospect	Looked for/not located
Fall Creek Saddle Occurrence	Cu	Unknown	Raw prospect	Located/sampled
Fall Creek Upper Prospect	Cu	Basaltic Cu	Dev. prospect	Located/sampled
Franklin	Cu	Basaltic Cu	Dev. prospect	Located/sampled
Good Enough	Cu, Ag	Basaltic Cu	Dev. prospect	Looked for/not located
Hidden Treasure	Cu, Au, Ag	Basaltic Cu	Dev. prospect	Revisited/not sampled
Homestake	Cu, Au, Ag	Basaltic Cu	Dev. prospect	Located/sampled
Kinney-Golden	Cu	Basaltic Cu	Dev. prospect	Area sampled
Larson	Cu	Basaltic Cu	Dev. prospect	Located/sampled
Lime Creek	Cu	Basaltic Cu	Dev. prospect	Located/sampled
London and Cape	Cu, Mo, Ag	Porphyry Cu-Mo	Dev. prospect	Located/sampled
Lost Cabin	Cu, Ag	Basaltic Cu	Dev. prospect	Located/sampled
Mineral Creek	Cu, Au, Ag	Basaltic Cu	Dev. prospect	Area sampled
Minneapolis	Cu	Basaltic Cu	Dev. prospect	Located/sampled
Newhome	Cu, Au, Ag	Basaltic Cu	Dev. prospect	Located/sampled
Nugget Creek Mine	Cu, Au, Ag	Basaltic Cu	Past producer	Located/sampled
Porcupine Creek Head	Cu, Au	Basaltic Cu	Dev. prospect	Looked for/not located
Roaring Creek	Cu	Basaltic Cu	Dev. prospect	Located/sampled
Roaring Creek Southeast	Cu	Basaltic Cu	Dev. prospect	Located/not sampled
Roaring Creek Southwest	Cu	Basaltic Cu	Dev. prospect	Located/not sampled
Skyscraper	Cu	Basaltic Cu	Dev. prospect	Located/not sampled
Skyscraper Peak West	Cu	Basaltic Cu	Dev. prospect	Located/sampled
Squaw Creek	Cu	Unknown	Dev. prospect	Located/not sampled
Sunrise	Cu, Au, Ag	Basaltic Cu	Dev. prospect	Located/sampled
Sunset	Cu, Au, Ag	Basaltic Cu	Dev. prospect	Located/sampled
Surprise/Sunshine	Cu	Basaltic Cu	Dev. prospect	Located/sampled
Warner	Cu	Basaltic Cu	Dev. prospect	Located/sampled

TABLE 3. - Mineral localities in the Valdez quadrangle.

Location name	Commodity	Deposit type	Mine type	BLM status - 1998
Alaska Copper Mines	Cu	Unknown	Exp. prospect	Looked for/not located
Bunker Hill	Cu	Basaltic Cu	Dev. prospect	Looked for/not located
Cave Prospect	Cu, Au	Basaltic Cu	Dev. prospect	Located/sampled
Copper King Mine	Au, Cu	Basaltic Cu	Past producer	Revisited/not sampled
Crawford	Uranium	Conglomerate	Raw prospect	Looked for/not located
Divide Creek	Cu	Basaltic Cu	Dev. prospect	Located/sampled
Dottie	Au	Placer	Exp. prospect	Looked for/not located
Falls Creek	Cu	Basaltic Cu	Exp. prospect	Located/sampled
Forget-Me-Not	Cu	Basaltic Cu	Dev. prospect	Located/sampled
Hubbard-Elliott Mine	Cu, Au, Ag	Basaltic Cu	Past producer	Located/not sampled
Montana Boy	Cu	Basaltic Cu	Dev. prospect	Located/sampled
Mountain Sheep	Cu	Basaltic Cu	Dev. prospect	Located/sampled
Mullen Mine	Cu, Ag	Basaltic Cu	Past producer	Revisited/not sampled

associated quartz and calcite veining. A representative chip sample (map no. 3, sample no. AAWSE 10098) collected from the shear zone above the portal contained 9.56% copper, 32.4 ppm silver, and 6 ppb gold. The opencut is located 50 ft. upstream and across the stream from the adit. It is dug along a shear zone trending S. 40° E., that contains disseminated chalcopyrite, pyrite, and malachite with associated quartz. The opencut is 15 ft. long, 7 ft. wide, and 5 ft. deep. A grab sample (map no. 2, sample AAWSE 10099) collected from the shear zone contained 5,732 ppm copper and 3.2 ppm silver.

Kotsina River Drainage

The Kotsina River drainage contains the Copper Creek, Roaring Creek, Rock Creek, and Surprise Creek tributaries. Prospects located along Copper Creek include the Mullen Mine and the Bunker Hill, Cave Prospect, Forget-Me-Not, Montana Boy, and the Mountain Sheep prospects. The Bunker Hill prospect was looked for but not located.

The Mullen Mine is patented and the only property on Copper Creek within the Ahtna, Inc. selection. The property was revisited and the underground workings examined. The map published by Van Alstine and Black (1946) shows an accurate depiction of the underground workings. The workings apparently have been mapped and sampled recently by an unknown party as sample location tags were found at each sample site. No samples were collected from the underground workings.

The Cave Prospect Adit No. 2 is driven S. 78° W., for 15 ft. along a shear zone in the Chitistone Limestone. The shear zone is malachite- and azurite-stained with small quartz veins. A select sample (map no. 15, sample no. AAWSE 10107) collected of the stained limestone contained 817 ppm copper. Adit No. 3 is located to the south, driven into a sheared limestone face. The adit was not examined; as access to the adit is not possible without ropes. Above Adit No. 2 is a small opencut dug into the limestone. No visible sulfide mineralization was noted.

The Forget-Me-Not prospect is located on the Middle Fork of Copper Creek. Workings consist of a small opencut in sheared and iron-oxide stained Nikolai Greenstone. A 3-ft.-wide shear zone trending N. 65° W. with a steep southern dip extends up slope 20 to 30 ft. and across slope for 40 ft. This shear zone appears to be a continuation of the mineralized shear zone that occurs at the Bluebird and Montana Boy prospects 200 yards to the east. The Bluebird prospect is visible from the Forget-Me-Not prospect. Malachite-stained quartz and calcite make up part of the shear zone. Chalcocite, bornite, chalcopyrite, pyrite, and malachite occur in the shear zone. A select sample (map no. 17, sample no. AAWSE 10105) collected from the shear zone contained 1.89% copper and 3.2 ppm silver.

The Montana Boy prospect consists of two opencuts. The lower opencut is located in iron-oxide stained Chitistone Limestone with small calcite veining. The opencut is 3 ft. wide, 15 ft. long, and 2 ft. deep. No visible sulfide mineralization was noted in the opencut. A grab sample (map no. 17, sample no. AAWSE 10074) collected of the iron-oxide stained limestone contained 44 ppm copper. The upper opencut is 3 ft. wide, 4 ft. long, and 3 ft. deep and is cut into the limestone. No visible sulfide mineralization was noted in the opencut.

Workings of the Mountain Sheep prospect include one adit driven into the Nikolai Greenstone. The adit is driven N. 55° W., for 20 ft., following a 3-ft.-wide shear zone. The adit is caved at 10 ft. from the portal. Bornite, chalcopyrite, malachite, and azurite occur within the shear zone. A select sample (map no. 16, sample no. AAWSE 10106) collected of mineralized rock from the floor of the adit contained 3% copper and 3.1 ppm silver.

The Rock Creek area contains workings of the Lime Creek and Warner prospects. The Lime Creek prospect is located within the Ahtna, Inc. selection and the Warner prospect is located outside the selection. The Lime Creek prospect consists of an adit driven N. 17° W. for 15 ft. into sheared Nikolai Greenstone. The adit cuts a 10- to 15-ft.-wide shear zone containing rose quartz and calcite. Massive bornite, chalcocite, chalcopyrite, malachite, and azurite occur in the shear zone. A representative chip sample (map no. 14, sample no. AAWSE 10071) collected of the high grade rock from the shear zone contained 23.99% copper, 4.8 ppm silver, and 608 ppb gold.

The Warner prospect located outside the Ahtna, Inc. selection contains an adit driven S. 72° E. for 30 ft. into iron-oxide stained Nikolai Greenstone. The adit is driven along a 2-ft.-wide shear zone containing disseminated bornite along with quartz and calcite veins. A select sample (map no. 10, sample no. AAWSE 10070) collected from the shear zone contained 3.46% copper, 3.8 ppm silver, and 16 ppb gold.

The Roaring Creek area is located outside the Ahtna, Inc. selection and includes the Roaring Creek, Roaring Creek Southeast, Roaring Creek Southwest, Skyscraper, and the Skyscraper Peak West prospects. The Roaring Creek prospect consists of a caved adit and an upper opencut. The Camp 3 Tunnel, Adit No. 1 was driven S. 24° W. into highly iron-oxide stained and fractured Nikolai Greenstone. Native copper, chalcocite, bornite, malachite, and azurite occur in the associated quartz and calcite veins. A high grade select sample (map no. 13, sample no. AAWSE 10089) from the trench contained 23.02% copper, 3.6 ppm silver, and 43 ppb gold. The upper opencut is cut into the same bedrock as the adit. Native copper, chalcocite, bornite, malachite, and azurite occur in the associated quartz and calcite veins. A high grade select sample (map no. 13, sample no. AAWSE 10090) collected from the trench contained 14.48% copper, 23.4 ppm silver, and 23 ppb gold.

The Roaring Creek Southeast and Southwest prospects are located near the head of the valley. The Southeast adit is caved while the Southwest

adit appeared from the air to be open. Lack of time prevented these prospects from being visited and sampled. Likewise, the Skyscraper prospect was only located from the air. The workings consist of an opencut and at least two open adits. The workings are located on the south side of Skyscraper Peak and have limited access due to steep slopes.

The Skyscraper Peak West prospect consists of an adit driven into Nikolai Greenstone and brecciated, amygdaloidal basalts with ⅛-in.-wide quartz and epidote veinlets. The adit is driven N. 4° E. for 40 ft. The adit is caved at 20 ft. from the portal. A shear zone, up to 6 in. wide, cuts perpendicular to the adit at the portal. No visible sulfide mineralization was noted at or near the adit. A grab sample (map no. 12, sample no. AAWSE 10091) collected of material that fell from the roof of the adit contained 196 ppm copper.

The Alaska Copper Mines, Crawford, Dottie, Larson, and the Surprise/Sunshine prospects are also located in the Kotsina River drainage. The Alaska Copper Mines and the Surprise/Sunshine properties are located outside the Ahtna, Inc. selection. The Alaska Copper Mines, Crawford, and Dottie prospects were looked for but not located. The Larson West workings consist of an adit and an opencut. The adit, sloughed at the portal, was driven S. 60° W., for 25 ft., in Nikolai Greenstone with epidote veins. No visible sulfide mineralization was noted in the adit or in the waste dump. No samples were collected. The adit was most likely driven to intercept the mineralized shear zones trending north-south above the adit. An opencut, located north of the adit, was cut along an iron-oxide stained shear zone containing chalcopyrite, pyrite, malachite, and associated quartz veins. This shear zone appears to be the shear zone the adit was driven to intersect. A grab sample (map no. 3, sample no. AAWSE 10097) collected from the shear zone contained 4,952 ppm copper, 2 ppm silver, and 6 ppb gold.

The Surprise/Sunshine prospect consists of one adit and two opencuts. The adit is driven N. 42° E., for 135 ft., into the Nikolai Greenstone. Numerous quartz veins, up to 4 in. wide, and a shear zone were noted in the adit. No sulfide mineralization was noted in the adit or the waste dump. Above the adit are the two opencuts, with Opencut No. 1 being located directly above the adit and Opencut No. 2 to the west. Opencut No. 1 is 4 ft. wide, 20 ft. long, and 20 ft. deep, dug N. 50° W. across a 2-ft.-thick quartz vein. The vein trends N. 60° W. and dips steeply southwest. The vein has a dark reddish tint and is malachite and azurite stained. Bornite, chalcocite, chalcopyrite, malachite, and azurite occur as pods and are also disseminated throughout the quartz. A select sample (map no. 7, sample no. AAWSE 10093) collected from the quartz vein contained 1.32% copper, 0.7 ppm silver, and 227 ppb gold. A select sample (map no. 7, sample AAWSE 10093-A) collected of high grade rock from the waste dump contained 20.49% copper, 6.6 ppm silver, and 2,938 ppb gold. Opencut No. 2 cuts a 4- to 5-ft.-wide white quartz vein trending N. 70° E. with a vertical dip. The opencut is 12 ft. wide, 15 ft. deep, and 10 ft. high at the face. This quartz vein contains more iron-oxide staining than the red quartz vein. Bornite, chalcocite, malachite, and azurite occur in the quartz vein. A select sample (map no. 7, sample no. AAWSE 10094) collected from the quartz vein contained 6,797 ppm copper, 2.1 ppm silver, and 66 ppb gold.

Kuskulana River Drainage

The Kuskulana River drainage contains the Berg Creek, Nugget Creek, Porcupine Creek, Squaw Creek, and Trail Creek drainages. Prospects in the Kuskulana River drainage inside the Ahtna, Inc. selection include Barrett Young and Nafsted, Blackburn, Porcupine Creek Head, and Squaw Creek. The Berg Creek Mine is located on Berg Creek. Nugget Creek contains the Minneapolis prospect and the Nugget Creek Mine. The Minneapolis prospect was looked for but not located, but the area was sampled.

Bedrock consists of highly sheared and altered Nikolai Greenstone with quartz and epidote veins up to 5 in. thick. Disseminated bornite, malachite, and azurite occur in the greenstone. A select sample (map no. 19, sample no. AAWSE 10078) collected of the greenstone contained 1,336 ppm copper, 0.2 ppm silver, and 18 ppb gold.

The Nugget Creek Upper Adit was located and a high grade sample collected from the waste dump. The adit is driven N. 32° W., for 20 ft., following an iron-oxide stained shear zone which has also been trenched in front of the portal. Bornite, malachite, and azurite occur in the shear zone. A select sample (map no. 18, sample no. AAWSE 10079) of the high grade rock contained 10.65% copper, 61.5 ppm silver, and 16 ppb gold.

Porcupine Creek contains the Barrett Young and Nafsted, Blackburn, and the Porcupine Creek Head prospects. The Barrett Young and Nafsted prospect is located at the head of Porcupine Creek. None of the adits were located but a shear zone with apparent opencuts was located. The 20 ft. wide, highly iron-oxide and malachite stained shear zone trends north-south and dips steeply to the south. Chalcopyrite, pyrite, malachite, and azurite occur along with quartz and epidote. A select sample (map no. 20, sample no. AAWSE 10082) collected from the shear zone contained 7,939 ppm copper, 0.7 ppm silver, and 50 ppb gold.

The Blackburn and Porcupine Creek Head prospects were looked for but not located. Bedrock in the Blackburn area consists of iron-oxide stained and sheared Nikolai Greenstone cut by dioritic dikes with quartz and epidote veining. Pyrite and minor chalcopyrite were noted in the diorite. Grab samples collected in the Blackburn area (map no. 21, sample nos. AAWSE 10080-10081) contained 504 and 440 ppm copper and 12 and 0.4 ppm silver, respectively. The first sample was collected from the diorite and the second was from greenstone float.

On the west side of the mouth of Squaw Creek is what appears to be an adit, the Squaw Creek prospect, located at the base of a vertical face of the Chitistone Limestone. The property was not visited. The adit is partially obscured by alder bushes and is in an extremely difficult location to access due to the steepness of the bluff below the adit. The closest landing zone is a dried up pond located to the southwest within the dense spruce forest. No historical information is known on this location.

Trail Creek contains the workings of the London and Cape prospect. A caved adit appears to have been driven S. 65° E. into diorite with mica and quartz veins. Pyrite, chalcopyrite, bornite, and malachite occur as disseminations in the bedrock and as veinlets along fracture planes. A grab sample (map no. 22, sample, no. AAWSE 10077) collected of the mineralized material at the mouth of the portal only contained 105 ppm copper. No other mineralization was noted in the area.

Elliott Creek Drainage

Workings on Elliott Creek include the Hubbard-Elliott and Copper King mines. Both the Hubbard-Elliot and Copper King mines have been patented and are owned by the same group of owners. The Copper King Mine and two adits on Rainbow Creek (Hubbard-Elliott Mine) were visited with one of the property's co-owners, Mr. Mike Hanscom, Anchorage, Alaska, and Danny Rosenkrans and Geoffrey Bleakley of the NPS. The Rainbow Creek workings are located outside of the Ahtna, Inc. selection and the Copper King Mine is located within the selection. No samples were collected.

Canyon Creek Drainage

The Canyon Creek drainage includes the workings of the Divide Creek and Falls Creek prospects. Neither of these properties is located within the Ahtna, Inc. selection. The Divide Creek prospect has four opencuts all

located within 300 ft. of each other. Bedrock in the area consists of Skolai Greenstone cut by iron-oxide stained shear zones containing quartz and epidote veining. Opencut No. 1 is 8 ft. wide, 12 ft. deep, and 5 ft. high at the face. Chalcopyrite, malachite, and azurite occur in the quartz veins. A select sample (map no. 24, sample no. AAWSE 10102) collected of the mineralized quartz vein contained 3.43% copper, 7.9 ppm silver, and 73 ppm gold. Opencut No. 2 is 5 ft. wide, 3 ft. long, and 5 ft. high at the face. Disseminated and veinlets of pyrite occur within the quartz and the bedrock. A select sample (map no. 24, sample no. AAWSE 10103) collected of the quartz vein contained 242 ppm copper, 0.4 ppm silver, and 23 ppb gold. Opencut No. 3 is T-shaped with the longest dimension being 15 ft. Chalcopyrite, pyrite, malachite, and azurite occur within the shear zone as well as disseminated within the bedrock. A select sample (map no. 24, sample no. AAWSE 10104) collected of the quartz vein contained 1.99% copper, 10.6 ppm silver, and 98 ppb gold. Opencut No. 4 is the smallest opencut. No visible sulfide mineralization was noted in the opencut.

The Falls Creek prospect Adit No. 2 workings on Canyon Creek was located. The adit is driven S. 3° W. for 100 ft., along a shear zone in highly sheared and fractured Skolai Greenstone with quartz and epidote veins. The adit must have been driven to intersect mineralized shear zones in the area. No visible sulfide mineralization was noted in the adit, the waste dump, or the surrounding bedrock. No samples were collected.

Other Drainages

The Chokosna, Escape, and Kinney-Golden prospects are located on the Chokosna River and the Carmalita prospect is located on the Lamina River. All of these properties are located within the Ahtna, Inc. selection. The Chokosna, Escape, and Kinney-Golden prospects were looked for but not located. The Kinney-Golden area consists of a slight iron-oxide stained, buff colored chloritic diorite. The staining occurs along fractures as well as on the surface of the diorite. The diorite is overlain by alternating layers of basalt, limestone, and bedded shale of the Skolai Group. The bedded shales range from ⅛ to 5 in. thick. Round plagioclase phenocrysts, up to ¼ in. in diameter, were noted within the basalt beds. Disseminated pyrite occurs within the basalts and the bedded shales, while the thicker shale beds contain up to ¼ in. pyrite blebs. A select sample (map no. 23, sample no. AAWSE 10083) collected of the pyritic basalt with plagioclase contained 61 ppm copper. A select sample (map no. 23, sample no. AAWSE 10084) collected of the thicker pyritic bedded shale contained 46 ppm copper and 0.2 ppm silver.

A placer sample was collected on the lower reaches of the Lamina River in the approximate location of the Carmalita prospect. A 1/10 cubic yard of material was processed through a mini sluicebox. Stream float consists of basalt, diorite, granite, and quartz cobbles up to 8 in. in diameter. The sample contained two very, very fine specks (approximately 0.1 mm) of gold along with a very minor amount of black sands. Lab analysis showed the sample (sample no. AAWSE 10095) to contain 2,411 ppb gold and 55 ppm copper.

SUMMARY

The southern Wrangell Mountains area has numerous properties that contain high mineral values located within or in close proximity to Ahtna, Inc. selected lands. Results from the samples collected during the 1998 field season identified 17 properties containing high values of copper, as well as anomalous values of silver and/or gold (Table 4). Properties with the highest values, in descending order, are the Lime Creek prospect, Roaring Creek prospect, Surprise/Sunshine prospect, Nugget Creek Mine, Sunset prospect, Warner prospect, Divide Creek prospect, Mountain Sheep prospect, Sunrise

TABLE 4. - 1998 Sampled properties containing anomalous copper, silver, and gold values.

Location name	Copper (%)	Silver (ppm)	Gold (ppb)
Lime Creek prospect	23.99	4.8	608
Roaring Creek prospect	23.02	23.4	43
Surprise/Sunshine prospect	20.27	6.6	2,938
Nugget Creek Mine	10.65	61.5	16
Sunset prospect	9.56	32.4	6
Warner prospect	3.46	3.8	16
Divide Creek prospect	3.43	11.6	98
Mountain Sheep prospect	3	3.1	<5
Sunrise prospect	2.77	6.6	16
Newhome prospect	2.61	11.6	20
Fall Creek Upper Prospect	1.94	6.4	6
Forget-Me-Not prospect	1.94	3.2	<5
Barrett Young and Nafsted prospect	2.77	0.7	50
Larson prospect	0.67	2	6
Fall Creek Saddle Occurrence	0.38	6.6	20
Mineral Creek prospect	0.16	0.3	18
Minneapolis prospect	0.13	0.2	18

prospect, Newhome prospect opencuts, Fall Creek Upper Prospect, and the Forget-Me-Not prospect.

Other properties with elevated copper values, also shown in Table 4, are the Barrett Young and Nafsted prospect, Larson prospect west adit, Fall Creek Saddle Occurrence, Mineral Creek prospect, and the Minneapolis prospect. Native copper was found at the Roaring Creek and Sunset Creek prospects, whereas, bornite, chalcocite, chalcopyrite, malachite, azurite, and/or pyrite minerals were found, in various concentrations, at all of these properties.

RECOMMENDATIONS

The following recommendations for work completed in 1998 are based on the historical literature search, field work, and samples collected for analysis during 1998. A final report and executive summary will be published that will cover all aspects of this study in both the northern and southern study areas completed during 1997 and 1998. That includes the economic analysis and final recommendations.

More detailed investigations could be conducted to further delineate the extent of mineralization on several properties located within Ahtna, Inc. selections. These properties have shown high mineral values from the samples collected during 1998. All of these properties occur in areas with little outcropping and are covered with either talus or vegetation which makes following the mineralization next to impossible. These properties include: the Fall Creek Upper Prospect, Lime Creek, Newhome, Sunset, and Sunrise prospects. The other properties listed in the summary containing elevated mineral values should also be considered

as potential sites for further exploration. The next stage of exploration techniques need to be incorporated into the investigation of these properties to further delineate the extent and grade of mineralization. Exploration techniques that are beyond the scope of this study that should be considered include airborne magnetic and electromagnetic surveys, induced polarization and magnetic ground geophysical surveys, detailed surface geologic mapping, soil grid sampling, trenching, and exploratory drilling.

It is recommended that Ahtna, Inc. consider any or all of the properties listed below in their selection process. Nine of the prospects are located inside the selection boundaries and include the Barrett Young and Nafsted prospect on Clear Creek, the Fall Creek Saddle Occurrence and the Fall Creek Upper Prospect on Fall Creek, the Larson and Mineral Creek prospects on the Kotsina River, the Lime Creek prospect on Rock Creek, and the Newhome, Sunrise, and the Sunset prospects on Fall Creek. Eight of the properties are located outside the boundary and are unavailable for selection; these include the Divide Creek prospect on Falls Creek, the Forget-Me-Not and Mountain Sheep prospects on the East Fork of Copper Creek, the Minneapolis prospect and the Nugget Creek Mine on Nugget Creek, the Roaring Creek prospect on Roaring Creek, the Surprise/Sunshine prospect on the Kotsina River, and the Warner prospect on Rock Creek.

Five of the properties located in the southern Wrangell Mountains area during 1998 have been historical producers. These include the Berg Creek, Copper King, Hubbard-Elliott, Mullen, and Nugget Creek mines. Seven of the properties located in 1998 have been patented. These include the Copper King, Hubbard-Elliott, Mullen, and Nugget Creek mines and the Franklin, Minneapolis, and Warner prospects. All of these properties, as well as those properties listed above, should be given consideration by Ahtna, Inc.

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APPENDIX A - 1998 ANALYTICAL RESULTS WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE

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Map no.	Sample no. AAWSE	Location name	Location							Au	Ag	Cu
			Latitude	Longitude	Quad.	Sec.	TWP	RNG	Elev.	ppb	ppm	ppm
1	10088	Fall Creek Saddle Occurrence	N 61° 48' 26"*	W 143° 56' 30"*	Mc. D-8	4	1S	8E	6050'	25	0.6	3769
2	10087	Fall Creek Upper Prospect	N 61° 47' 48.967"	W 143° 56' 23.400"	Mc. D-8	10	1S	8E	5270'	6	6.4	>10000
2	10089	Sunset Opencut	N 61° 47' 41.229"	W 143° 53' 41.015"	Mc. D-8	10	1S	8E	4160'	<5	3.2	5732
3	10092	Sunset Adit	N 61° 47' 39.471"	W 143° 53' 40.449"	Mc. B-8	10	1S	8E	4150'	6	32.4	>10000
4	10096	Sunrise Opencut No. 2	N 61° 47' 34.191"	W 143° 55' 57.940"	Mc. D-8	10	1S	8E	4690'	10	8.9	>10000
5	10089	Homestake Upper Opencut	N 61° 47' 27.734"	W 143° 56' 12.206"	Mc. D-8	10	1S	8E	4690'	8	<0.2	215
5	10100	Newhome Opencut No. 1	N 61° 47' 25.172"	W 143° 53' 59.268"	Mc. D-8	10	1S	8E	4490'	6	11.6	>10000
5	10101	Newhome Opencut No. 3	N 61° 47' 28.183"	W 143° 56' 01.129"	Mc. D-8	10	1S	8E	4520'	20	5.6	>10000
6	10096	Franklin	N 61° 46' 12.304"*	W 143° 53' 05.481"*	Mc. D-8	24	1S	8E	4080'	<5	<0.2	186
7	10093	Surprise/Sunshine Opencut No. 1	N 61° 45' 07.382"	W 143° 48' 24.057"	Mc. D-8	29	1S	8E	5640'	227	0.7	>10000
7	10093A	Surprise/Sunshine Opencut No. 1	N 61° 45' 07.382"	W 143° 48' 24.057"	Mc. D-8	29	1S	9E	5640'	2938	6.6	>10000
7	10094	Surprise/Sunshine Opencut No. 2	N 61° 45' 06.646"	W 143° 48' 26.493"	Mc. D-8	29	1S	9E	5630'	66	2.1	6797
8	10089	Mineral Creek	N 61° 44' 55.193"	W 143° 53' 39.312"	Mc. C-8	26	2S	8E	4150'	10	0.3	1583
9	10072	Lost Cabin Upper Adit	N 61° 44' 01.510"*	W 143° 59' 46.135"*	Mc. C-8	3	2S	8E	4010'	6	0.2	224
9	10073	Lost Cabin Upper Adit	N 61° 44' 01.510"*	W 143° 59' 46.135"*	Mc. C-8	3	2S	8E	4010'	<5	0.2	253
10	10069	Rock Creek	N 61° 42' 30.549"	W 143° 57' 39.265"	Mc. C-8	9	2S	8E	2330'	<5	<0.2	70
10	10096	Warner	N 61° 42' 31.701"	W143° 57' 40.356"	Mc. C-8	9	2S	8E	2330'	16	3.8	>10000
11	10096	Larson West Adit	N 61° 42' 09.170"	W 143° 52' 40.931"	Mc. C-8	12	2S	8E	4950'	<5	1.3	6714
11	10092	Larson West Opencut	N 61° 42' 10.063"	W 143° 52' 43.918"	Mc. C-8	12	2S	8E	4950'	6	2	4952
12	10091	Skyscraper Peak West	N 61° 41' 25.393"	W 143° 48' 06.158"	Mc. C-8	17	2S	9E	4790'	<5	<0.2	196
12	10092	Skyscraper Peak	N 61° 41' 21.448"	W 143° 48' 04.306"	Mc. C-8	17	2S	9E	4740'	<5	<0.2	579
13	10089	Roaring Creek Adit No. 1	N 61° 41' 18.113"	W 143° 50' 31.087"	Mc. C-8	18	2S	9E	5290'	43	3.6	>10000
13	10096	Roaring Creek Upper Opencut	N 61° 41' 17.893"	W 143° 50' 33.355"	Mc. C-8	18	2S	9E	5360'	23	23.4	>10000
14	10071	Lime Creek	N 61° 41' 33.004"	W 143° 55' 56.244"	Mc. C-8	15	2S	8E	3890'	608	4.8	>10000
15	10107	Cave Prospect Adit No. 2	N 61° 40' 20.403"	W 144° 04' 14.415"	Val. C-1	25	2S	7E	4350'	<5	<0.2	817
16	10106	Mountain Sheep	N 61° 40' 02.683"	W 144° 03' 14.612"	Val. C-1	25	2S	7E	4760'	<5	3.1	>10000
17	10094	Montana Boy	N 61° 39' 45.979"*	W 144° 01' 56.875"*	Val. C-1	3	2S	8E	5230'	<5	<0.2	44
17	10105	Forget-Me-Not	N 61° 39' 44.654"	W 144° 02' 09.822"	Val. C-1	30	2S	8E	4750'	<5	3.2	>10000
18	10079	Nugget Creek Upper Adit	N 61° 38' 34.651"	W 143° 43' 05.293"	Mc. C-8	2	3S	9E	3660'	16	61.5	>10000

*GPS coordinates could not be differentially corrected for this position. Mc. = McCarthy; Val. = Valdez.

APPENDIX A - 1998 ANALYTICAL RESULTS WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE--CONTINUED.

Map no.	Sample no. AAWSE	Cu pct	Cu pct	Cu pct	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Co ppm	Cd ppm	Bi ppm	As ppm	Sb ppm	Fe pct	Mn ppm	Te ppm	Ba ppm	Cr ppm	V ppm	Sn ppm	W ppm	La ppm
1	10088				<2	57	1	50	19	<0.2	<5	12	<5	3.80	459	<10	5	88	123	<20	<20	3
2	10087	1.94			9	72	<1	22	10	15.5	<5	<5	<5	1.79	250	<10	<1	86	72	<20	<20	2
7	10098				9	55	<1	35	10	<0.2	<5	5	<5	3.21	287	<10	<1	90	103	<20	<20	4
3	10098	9.56			34	206	2	20	9	<0.2	<5	21	<5	1.08	109	<10	1	50	30	<20	<20	1
4	10076	2.77			9	86	<1	33	20	0.3	<5	<5	<5	1.70	198	<10	3	56	74	<20	<20	3
5	10085				<2	71	<1	50	33	<0.2	<5	<5	<5	5.75	772	<10	1	67	177	<20	<20	7
5	10100	2.49			10	110	8	33	10	28	<5	<5	<5	2.30	313	<10	21	92	74	<20	<20	4
5	10101	2.61			32	88	1	37	20	<0.2	<5	<5	<5	2.55	366	<10	10	70	70	<20	<20	5
6	10076				<2	45	<1	22	21	<0.2	<5	<5	<5	3.55	444	<10	250	25	85	<20	<20	4
7	10093	1.32			11	81	2	20	22	<0.2	<5	12	<5	1.73	130	<10	4	149	41	<20	<20	1
7	10093A	>15.00	20.27	20.49	<2	41	<1	7	10	<0.2	<5	<5	<5	0.53	11	<10	1	9	12	<20	<20	<1
7	10093				6	51	3	25	21	0.6	<5	<5	<5	1.13	141	<10	2	223	20	<20	<20	<1
8	10075				<2	37	26	92	57	<0.2	<5	<5	<5	7.97	362	<10	12	92	107	<20	<20	6
9	10072				<2	7	<1	<1	<1	<0.2	<5	7	<5	0.06	68	<10	4	11	3	<20	<20	13
9	10073				<2	2	<1	<1	<1	<0.2	<5	11	<5	0.09	68	<10	1	4	2	<20	<20	16
10	10069				11	70	<1	<1	5	<0.2	<5	697	10	1.54	28	<10	43	41	7	<20	<20	<1
10	10070	3.46			13	180	<1	33	27	1.6	<5	<5	<5	5.65	722	<10	5	31	172	<20	<20	6
11	10096				3	43	<1	20	17	<0.2	<5	9	<5	1.65	305	<10	1	112	51	<20	<20	3
11	10097				2	68	1	23	13	<0.2	<5	17	<5	1.83	387	<10	10	94	81	<20	<20	3
12	10091				6	84	<1	32	32	<0.2	<5	<5	<5	7.24	726	<10	15	10	242	<20	<20	12
12	10092				2	10	2	11	9	<0.2	<5	<5	<5	1.09	144	<10	<1	90	52	<20	<20	1
13	10089	>15.00	23.53	23.02	<2	44	<1	1	2	<0.2	<5	10	<5	0.24	58	<10	<1	1	2	<20	<20	<1
13	10089	14.48			50	334	<1	32	20	<0.2	<5	271	<5	2.76	529	<10	1	<1	70	<20	<20	4
14	10071	>15.00	24.03	23.99	12	58	<1	<1	<1	0.7	<5	<5	<5	0.47	182	<10	<1	2	7	<20	<20	<1
15	10107				9	9	<1	2	<1	17.6	<5	268	<5	0.10	176	<10	10	24	3	<20	<20	<1
16	10106	3.00			131	68	<1	54	55	<0.2	<5	11	<5	8.20	689	<10	9	92	250	<20	<20	4
17	10074				<2	2	<1	<1	<1	<0.2	<5	5	<5	0.17	901	<10	4	<1	1	<20	<20	13
17	10105	1.89			87	60	<1	58	32	0.3	<5	20	<5	5.33	597	<10	9	70	144	<20	<20	3
18	10079	10.65			117	337	35	28	9	277.1	<5	<5	<5	3.47	305	<10	18	11	79	<20	<20	4

APPENDIX A - 1998 ANALYTICAL RESULTS WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE--CONTINUED.

Map no.	Sample no. AAWSE	Al pct	Mg pct	Ca Pct	Na pct	K pct	Sr ppm	Y ppm	Ga ppm	Li ppm	Nb ppm	Sc ppm	Ta ppm	Ti ppm	Zr ppm
1	10088	2.14	1.66	2.33	<0.01	<0.01	41	8	6	5	<1	11	<10	0.45	21
2	10087	1.14	0.91	1.31	<0.01	<0.01	11	5	4	2	7	5	<10	0.35	20
2	10099	2.75	1.07	4.05	<0.01	<0.01	6	5	8	2	7	6	<10	0.33	15
3	10098	1.42	0.37	1.73	<0.01	<0.01	6	1	4	<1	3	<5	<10	0.14	5
4	10086	1.63	0.82	2.17	<0.01	<0.01	16	5	5	2	8	<5	<10	0.57	27
5	10085	2.34	2.21	3.92	0.05	0.03	53	12	8	7	12	11	<10	0.57	19
5	10100	1.71	0.98	4.00	<0.01	0.01	11	5	5	3	7	<5	<10	0.38	21
5	10101	1.85	1.16	4.10	<0.01	0.03	11	6	5	3	7	5	<10	0.33	20
6	10076	1.98	1.07	1.38	0.14	0.08	43	11	5	16	6	<5	<10	0.27	4
7	10093	0.75	0.21	1.13	0.07	0.02	15	3	<2	<1	4	<5	<10	0.09	2
7	10093A	0.05	0.03	0.01	<0.01	<0.01	4	<1	<2	<1	<1	<5	<10	<0.01	<1
7	10094	0.29	0.17	0.54	<0.01	0.02	5	2	<2	1	2	<5	<10	<0.01	1
8	10075	2.24	0.77	1.75	0.2	0.06	84	7	6	5	7	7	<10	0.25	8
9	10072	0.07	0.18	>10.00	<0.01	0.03	898	16	<2	<1	<1	<5	<10	<0.01	<1
9	10073	0.06	0.14	>10.00	<0.01	0.03	1059	11	<2	<1	<1	<5	<10	<0.01	<1
10	10069	0.77	0.02	1.69	<0.01	0.19	27	2	<2	4	<1	<5	<10	<0.01	2
16	10070	2.25	2.16	4.12	0.02	0.08	21	12	5	13	14	12	<10	0.31	16
11	10096	1.34	0.59	4.95	<0.01	<0.01	172	3	3	2	3	<5	<10	0.16	6
11	10097	1.47	1.21	4.52	<0.01	0.12	37	4	4	4	6	<5	<10	0.24	14
12	10091	3.45	2.44	2.26	0.12	0.03	43	16	12	11	12	12	<10	0.49	39
12	10092	1.13	0.3	2.36	<0.01	<0.01	170	4	4	<1	4	<5	<10	0.16	11
13	10089	0.17	0.14	0.16	<0.01	<0.01	4	<1	<2	<1	<1	<5	<10	0.03	<1
13	10090	2.05	1.57	2.20	<0.01	0.01	49	6	7	4	15	5	<10	0.33	15
14	10071	0.06	0.03	0.28	<0.01	<0.01	8	<1	<2	<1	<1	<5	<10	0.04	<1
15	10107	0.04	6.05	>10.00	<0.01	0.01	91	<1	3	<1	1	<5	<10	<0.01	<1
16	10106	2.84	3.28	2.14	0.05	0.04	29	12	<2	16	3	16	<10	0.69	54
12	10074	0.03	0.19	>10.00	<0.01	<0.01	309	<1	<2	<1	<1	<5	<10	<0.01	<1
12	10108	3.62	2.02	3.16	0.05	<0.01	11	12	7	8	1	6	<10	0.41	26
18	10079	1.92	3.09	5.30	<0.01	<0.01	81	5	6	18	13	6	<10	<0.01	<1

APPENDIX A - 1998 ANALYTICAL RESULTS WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE--CONTINUED.

Map no.	Sample no. AAWSE	Location name	Location							Au	Ag	Cu
			Latitude	Longitude	Quad.	Sec.	TWP	RNG	Elev.	ppb	ppm	ppm
19	10078	Minneapolis	N 61° 38' 35.239"	W 143° 45' 06.494"	Mc. C-8	3	3S	9E	4390'	18	0.2	1336
20	10082	Barrett Young & Nafsted	N 61° 38' 10.313"	W 143° 50' 50.201"	Mc. C-8	6	3S	9E	5960'	50	0.7	7939
21	10080	Blackburn	N 61° 37' 21.462"	W 143° 47' 13.307"	Mc. C-8	9	3S	9E	3495'	12	<0.2	504
21	10081	Blackburn	N 61° 37' 20.794"	W 143° 47' 25.293"	Mc. C-8	9	3S	9E	3750'	<5	0.4	440
22	10077	London and Cape	N 61° 34' 01.525"	W 143° 43' 06.402"	Mc. C-8	35	3S	9E	4510'	<5	<0.2	105
23	10083	Kinney-Golden area	N 61° 30' 46.422"	W 143° 47' 43.421"	Mc. C-7	2	4S	10E	3950'	<5	<0.2	61
23	10083	Kinney-Golden area	N 61° 30' 44.818"	W 143° 37' 44.722"	Mc. C-7	2	4S	10E	4070'	<5	0.2	46
24	10102	Divide Creek Opencut No. 1	N 61° 21' 50.641"	W 144° 16' 37.169"	Val. B-1	11	6S	6E	4550'	73	7.9	>10000
24	10104	Divide Creek Opencut No. 2	N 61° 21' 51.578"	W 144° 16' 39.437"	Val. B-1	11	6S	6E	4560'	23	0.4	242
24	10104	Divide Creek Opencut No. 3	N 61° 21' 49.081"	W 144° 16' 40.560"	Val. B-1	11	6S	6E	4600'	98	10.6	>10000
	10095	Carmalita	N 61° 20' 44.761"	W 143° 33' 49.245"	Mc. B-7	14	6S	10E	900'	2411	<0.2	55

*GPS coordinates could not be differentially corrected for this position. Mc. = McCarthy; Val. = Valdez.

APPENDIX A - 1998 ANALYTICAL RESULTS WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE--CONTINUED.

Map no.	Sample no. AAWSE	Cu pct	Cu pct	Cu pct	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Co ppm	Cd ppm	Bi ppm	As ppm	Sb ppm	Fe pct	Mn ppm	Te ppm	Ba ppm	Cr ppm	V ppm	Sn ppm	W ppm	La ppm
19	10078				<2	19	<1	23	18	<0.2	<5	<5	<5	2.09	259	<10	<1	58	77	<20	<20	4
20	10082				5	106	<1	35	33	0.3	<5	125	<5	5.77	1389	<10	14	54	112	<20	<20	4
21	10080				3	16	2	1	11	0.5	<5	<5	<5	2.35	259	<10	96	44	69	<20	<20	21
21	10081				<2	26	<1	37	23	1.6	<5	<5	<5	3.60	357	<10	4	98	104	<20	<20	5
22	10077				<2	27	2	2	4	<0.2	<5	<5	<5	2.01	275	<10	38	68	67	<20	<20	8
23	10083				4	50	<1	4	9	<0.2	<5	<5	<5	3.28	924	<10	988	45	113	<20	<20	11
23	10084				<2	62	1	10	1	0.3	<5	<5	<5	2.47	620	<10	116	26	91	<20	<20	24
24	10102	3.43			12	101	2	30	27	0.3	<5	<5	<5	5.36	413	<10	1	77	135	<20	<20	3
24	10103				<2	47	<1	44	27	<0.2	<5	47	<5	5.75	484	<10	<1	130	185	<20	<20	4
24	10104	1.99			96	16	2	7	10	1.3	<5	5	<5	2.48	109	<10	2	76	77	<20	<20	2
	10095				<2	113	1	48	10	<0.2	<5	10	<5	>10.00	382	<10	79	144	626	<20	<20	13

Map no.	Sample no. AAWSE	Al pct	Mg pct	Ca Pct	Na pct	K pct	Sr ppm	Y ppm	Ga ppm	Li ppm	Nb ppm	Sc ppm	Ta ppm	Ti ppm	Zr ppm
19	10078	1.28	0.78	3.75	<0.01	<0.01	60	6	3	1	5	6	<10	0.36	16
20	10082	1.55	0.3	1.25	0.15	0.14	66	13	4	1	8	11	<10	0.23	9
21	10082	1.22	0.54	1.00	0.19	0.13	223	8	5	3	5	<5	<10	0.07	9
21	10081	2.2	1.62	2.29	0.01	<0.01	141	8	5	3	8	5	<10	0.38	13
22	10077	1.44	0.36	1.31	0.21	0.07	155	3	4	4	5	<5	<10	0.11	4
23	10083	2.02	1.85	1.59	0.22	0.12	131	7	7	17	8	10	<10	0.06	7
23	10084	1.08	0.63	>10.00	0.02	0.14	786	40	3	8	4	10	<10	<0.01	<1
24	10102	1.62	1.25	3.13	0.02	<0.01	188	8	6	3	12	6	<10	0.56	22
24	10104	1.71	1.71	1.30	0.06	<0.01	53	10	6	5	14	<5	<10	0.66	27
24	10104	0.96	0.09	2.40	<0.01	<0.01	136	6	<2	<1	2	<5	<10	0.46	16
	10095	0.56	0.57	3.83	0.02	0.02	156	8	7	4	42	<5	<10	0.21	4

APPENDIX B - PROPERTY SUMMARY SHEETS WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE

ALASKA COPPER MINES

MAS no: 0020860128 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Sport Nos. 2-3
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Unknown

Location: At approximately the 2,150 ft. elevation on the west side of the mouth of Pass Creek, a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 008 E. *Section:* 07
Quadrangle: Valdez C-1 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Exploration prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1958 - Two claims staked by Scott Simenstad (KX 86-153).

Operating data:
None reported.

Geologic setting:
Bedrock consists of massive impure limestone overlain by Chitistone Limestones and associated with a granodiorite pluton.

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for but not located during 1997 and 1998.
Estimated location:
Latitude N 61° 42' 37"; Longitude W 144° 02' 22"; Elevation 2,150 ft.

References:

Bibliography:
ALASKA KARDEX 86-153

Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 15, 39.

BARRETT, YOUNG, & NAFSTED

MAS no: 0020870147 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Porcupine Creek
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: At the 6,040 ft. elevation in the northwestern headwaters of Porcupine Creek, a northern tributary of the Kuskulana River.

Township: 003 S. *Range:* 009 E. *Section:* 06
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Exploration prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1900 - Three claims staked by Barrett, Young, & Nafsted (Moffit and Mertie, 1923).

Operating data:
Two tunnels (Moffit and Mertie, 1923).

Geologic setting:
Bedrock consists of sheared Nikolai Greenstone containing zones of faults and fractures trending northeast. Veinlets of malachite and chalcopyrite cut the iron-stained greenstone (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Located and sampled during 1998.
Located a 20 ft. wide highly iron-oxide and malachite stained shear zone which strikes northeast-southwest and dips steeply south. The outcrop is highly weathered and has a small cave starting to form. Chalcopyrite, pyrite, malachite, and azurite occur along with quartz and epidote.
A select sample (**AAWSE 10082**) collected from the shear zone contained 7,939 ppm copper, 0.7 ppm silver, and 50 ppb gold.
Latitude N 61° 38' 10.313"; Longitude W 143° 50' 50.201"; Elevation 6,040 ft.

References:

Bibliography:

ALASKA KARDEX 87-037

Moffit, F.H., 1915, Mineral deposits of the Kotsina-Kuskulana district, with notes on mining in Chitina valley, *in* Brooks, A.H., and others, Mineral resources of Alaska, report on progress of investigations in 1914: U.S. Geological Survey Bulletin 622, p. 158.

Moffit, F.H., and Mertie, J.B., Jr., 1923, The Kotsina-Kuskulana district, Alaska: U.S. Geological Survey Bulletin 745, p. 128.

Heiner, L.E., Wolff, E.N., and Grybeck, D., 1971, Copper mineral occurrences in the Wrangell Mt. - Prince William Sound area, Alaska: Mineral Industry Research Laboratory Report 27, p. 65.

Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 129-130.

BERG CREEK MINE

MAS no: 0020870073 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Camp Bird Lode
Century Lode
Dupont Lode
Engineer Syndicate
Golconda
Gold Eagle
Hercules Lode
May Day Lode
Midas Burdick
Midas Gold Mine
Minnehaha Lode
Morning Lode
North Midas Mine
North Midas 1-4
Ole Berg Property
Sunrise No. 1-3 Lode
North Midas Millsite
Triple M Millsite

Company name(s):
Kelley Development Co.
North Midas Copper Co.

Mineral survey(s):
M.S. 1558 A&B

Commodity: Gold, silver, copper
Deposit type: Cu skarn

Location: Located between the 2,850 and 3,000 ft. elevations on the west side of Berg Creek, a southern tributary of the Kuskulana River. The mill site is located at the 2,835 ft. elevation near the junction of Berg and MacDougall Creeks.

Township: 004 S. *Range:* 009 E. *Section:* 04
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Past producer

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:

1907 - Ole Berg discovered the mineralization (Moffit and Mertie, 1923). Eighteen lode and 4 placer claims along with 1 power claim staked.

1913 - Development work done (Brooks, 1914).

1914 - Only assessment work done (Moffit, 1915).
1915 - Development work done (Brooks, 1916).
1916 - Development work done on Tunnel No. 4, driven 80 ft. (Moffit, 1918).
1918 - Mill and cyanide plant completed and put into operation (Martin, 1919a).
- A carload of ore produced and shipped. Tunnel No. 5 developed (Martin, 1919a).
1919 - Tram line (3.5 cu. ft. bucket capacity) started, development and mining done (Brooks, 1921).
- Mill was run only for a short period of time due to high water on Berg Creek (Moffit and Mertie, 1923).
1920 - Underground work done, but the mill was not operated (Brooks, 1922).
1921 - Claims staked by Gordon Burdick, W.D. Rich, and J.F. Crane (KX 87-014).
1922 - Development work done (Brooks and Capps, 1924).
- Cyanide plant replaced by a flotation plant with gold and silver-bearing pyrite concentrated to a shipping product. Concentrates hauled by tractor 12 miles to Strelna and shipped on the Copper River & Northwestern Railway (Brooks and Capps, 1924).
- Diesel engine installed as source of auxiliary power (Brooks and Capps, 1924).
1923 - Productive mining accomplished (Brooks, 1925).
1925 - Two men doing assessment work of surface stripping (Shepard, 1926).
1943 - Adits No. 1, 2, 3 were caved at the portals, No. 4 was ice blocked at 60 ft., No. 5 was ice blocked at 150 ft. (Van Alstine and Black, 1946).
1965 - Claims staked by Robert C. and Vera Moore (KX 87-133).

Production:

1918 - A carload of ore produced and shipped during the winter (Martin, 1919b).
1919 - A few ounces of gold and silver produced (Moffit and Mertie, 1923).

Operating data:

1916 - Four crosscuts driven to intersect ore (Smith, 1917b).
- Four tunnels, three started prior to 1916, with a combined length of 1,150 ft., Tunnel No. 4 was 80 ft. long (Moffit, 1918).
1918 - Tunnel No. 5, (highest tunnel) known as the "working tunnel," was driven 570 ft. (Martin, 1919b).
- Ore was originally mined from Tunnel No. 4. Tunnel No. 5 cuts the vein 570 ft. from the portal and 120 ft. vertically, below No. 4 (Martin, 1919b).
- Mill and cyanide plant (Martin, 1919b).
The 25 ton per day mill included Blake and Wheeling crushers, a Denver ball mill, a Dorr thickener, mechanical agitators, and an Oliver filter. The cyanide plant used an all-slime process with precipitation by zinc shavings (Martin, 1919b).
- Power plant with a 8 to 14 in. pipeline, 2,200 ft. long, with a 200 ft. head and a 60 hp. Castle wheel (Martin, 1919b).
- A Roebling tram, 4,600 ft. long, with a 1,000 ft. drop, 500 pound automatic loading and discharge buckets, and a capacity of 5 tons per hour (Martin, 1919b).
1919 - Over 1,600 ft. of levels and adits driven. Two levels 100 ft. apart and a short intermediate level driven from the upper level. Ore drawn off from the lower level

(Brooks, 1921).

Tunnel No. 1

Located at the 3,000 ft. elevation, 1,200 ft. from Berg Creek. Driven 480 ft., S. 5° E. Minerals include magnetite, pyrite, and chalcopyrite (Moffit and Mertie, 1923).

Tunnel No. 2

Located 500 ft. southwest of Tunnel No. 1 at the 3,250 ft. elevation. Driven 140 ft. in a southerly direction with a short crosscut 100 ft. from the portal. A shallow winze was sunk in the eastern crosscut (Moffit and Mertie, 1923). Minerals includes pyrite and chalcopyrite.

Tunnel No. 3

Located 1,000 ft. southwest of Tunnel No. 2 at the 3,175 to 3,200 ft. elevation. Driven nearly 500 ft. to the south-southeast. Minerals include pyrite and chalcopyrite (Moffit and Mertie, 1923).

Tunnel No. 4

Located 450 ft. south-southwest from Tunnel No. 5 at the 2,900 ft. elevation. Driven following the vein which strikes N. 70° E. and dips 45° S. (Moffit and Mertie, 1923).

Tunnel No. 5

Located at the 2,800 ft. elevation. Driven following the vein which strikes N. 70° E. and dips 45° S. (Moffit and Mertie, 1923).

Geologic setting:

Bedrock consists of extremely altered and much faulted Chitistone Limestone and Nikolai Greenstone intruded by light-colored diorite porphyry. Magnetite, pyrite, gold, and chalcopyrite is deposited along a fault plane (Moffit, 1921). Tunnel No. 4 yielded high values of gold giving the notion to mine for gold verses copper (Moffit, 1918). A vein 1½ to 6 ft. wide, averaging 2 or 3 ft. wide, made up of quartz and chalcopyrite with copper carbonate staining, strikes N. 70° E. (Moffit, 1921) and dips 45 to 55° SE. (Martin, 1919b).

Recent investigations:

USGS/USBM/BLM work:

BLM

Located the Millsite and "Working Tunnel" No. 5 level during 1997. Vegetation at the site is very thick making it extremely difficult to locate the portal.

Revisited site during 1998.

Tunnel No. 4

Adit reportedly open. Located in gully to the west of Tunnel No. 5. Was not visited due to time constraints.

No samples collected.

Estimated location:

Latitude N 61° 32' 59"; Longitude W 143° 47' 40"; Elevation 2,950 ft.

Tunnel No. 5 - "Working Tunnel" level

Upper terminus of aerial tramway. Workings caved at the portal. The actual portal was not located due to the density of the alder regrowth covering the workings. Material collected from the ore bunker beneath the upper tramway

station consists of malachite, azurite, and chalcopyrite associated with quartz and iron-oxide stained massive chalcopyrite.
Latitude N 61° 33' 09.332"; Longitude W 143° 47' 19.801"; Elevation 2,825 ft.
A select sample (**AAWSE 10059**) collected from the waste dump contained 4,514 ppm copper, 67.8 ppm silver, and 17.75 ppm gold.
A select sample (**AAWSE 10060**) collected from the ore bunker contained 2,872 ppm copper, 316.2 ppm silver, and 48.48 ppm gold.
Adit location:
Latitude N 61° 33' 06.337"; Longitude W 143° 47' 26.360"; Elevation 2,863 ft.

Millsite

The mill building is mostly collapsed and still contains much of its milling equipment and engines. The mill is also the lower terminus of the aerial tramway, which has collapsed, leaving the cables strewn along its route to the upper station. There is one cabin that still has its roof, while all other buildings have either collapsed or are in the process of collapsing.
Latitude N 61° 33' 09.488"; Longitude W 143° 47' 19.200"; Elevation 2,835 ft.

References:

Bibliography:

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ALASKA KARDEX 87-133

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BLACKBURN

MAS no: 0020870064 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Blackburn Group
Blackburn 1-3
Company name(s):
Alaska United Exploration Co.
Mineral survey(s):

Commodity: Copper, gold
Deposit type: Basaltic Cu

Location: At approximately the 3,650 ft. elevation on the west side of Porcupine Creek, a northern tributary of the Kuskulana River.

Township: 003 S. *Range:* 009 E. *Section:* 09
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1923 - Three tunnels driven (Moffit, 1918).

Operating data:
Blackburn group;
Highest tunnel is 75 ft. long (Moffit and Mertie, 1923).
Middle tunnel is caved (Moffit and Mertie, 1923).
Lowest tunnel is 125 ft. long with two short branches (Moffit and Mertie, 1923).

Geologic setting:
Bedrock consists of fine-grained basalt (Nikolai Greenstone) cut by dioritic dikes where both are shattered. A vertical fault strikes N. 25° E. Pyrite, chalcopyrite, and associated iron-oxide staining occurs along the dikes (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for but not located in 1997.
Looked for but no workings located in 1998. Samples were collected in the area.
Bedrock consisted of iron-oxide stained and sheared Nikolai Greenstone and diorite with quartz and epidote veins. The diorite contains disseminated chalcopyrite and pyrite. The greenstone contains chalcopyrite, pyrite, and malachite.

A grab sample (**AAWSE 10080**) collected from a diorite boulder contained 504 ppm copper and 12 ppb gold.
Latitude N 61° 37' 21.462"; Longitude W 143° 47' 13.307"; Elevation 4,550 ft.
A grab sample (**AAWSE 10081**) collected of the greenstone float contained 440 ppm copper and 0.4 ppm silver.
Latitude N 61° 37' 20.794"; Longitude W 143° 47' 25.293"; Elevation 3,800 ft.
Estimated location:
Latitude N 61° 37' 17"; Longitude W 143° 47' 03"; Elevation 3,650 ft.

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BUNKER HILL

MAS no: 0020860195 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Bunker Hill Group
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: At approximately the 5,500 ft. elevation on the west side of the East Fork Copper Creek, a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 008 E. *Section:* 29
Quadrangle: Valdez C-1 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1922 - Prospecting done (Moffit and Mertie, 1923).

Operating data:
Bunker Hill Group
A 15 ft. tunnel driven S. 10° E. and an opencut trending S. 30° E. (Moffit and Mertie, 1923; Van Alstine and Black, 1946).

Geologic setting:
Adit driven into Chitistone Limestone. Nikolai Greenstone underlies the limestone and locally has also been thrust over the limestone. The limestone is fractured and contains veinlets of quartz, calcite, epidote, malachite, and azurite up to 1 in. thick. Copper minerals in the vein include bornite, chalcopyrite, malachite, and azurite. The greenstone is shattered and mineralized with bornite, pyrite, and chalcopyrite. Malachite and azurite occur as secondary oxidation products (Moffit and Mertie, 1923; Van Alstine and Black, 1946).

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for but not located in 1998.
Estimated location:
Latitude N 61° 40' 03"; Longitude W 144° 00' 32"; Elevation 5,500 ft.

References:

Bibliography:

Moffit, F.H., and Mertie, J.B., Jr., 1923, The Kotsina-Kuskulana district, Alaska: U.S. Geological Survey Bulletin 745, p. 104.

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CARMALITA

MAS no: 0020870138 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Company name(s):
Mineral survey(s):

Commodity: Gold
Deposit type: Placer

Location: At approximately the 2,100 ft. elevation of Crystal Creek just upstream of the Lakina River, a northern tributary of the Chitina River.

Township: 006 S. *Range:* 010 E. *Section:* 13
Quadrangle: McCarthy B-7 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Exploration prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1975 - One claim staked by David Kesinger (KX 87-188).

Operating data:
None reported.

Geologic setting:
River gravels containing boulders of gabbro, gniess, marble, limestone, greenstone, and quartz.

Recent investigations:

USGS/USBM/BLM work:
BLM
Placer sample collected from the Lakina River during 1998.
Placer sample **AAWSE 10095** was collected from the lower reach of the Lakina River. A 1/10 cubic yard placer sample was processed through a mini sluicebox. Stream float consists of basalt, diorite, granite, and quartz. Cobbles range up to 8 in. in diameter. Collected sample from lower edge of a gravel bar. Very minor amount of black sands were collected in the sample. Recovered two very, very fine specks (approximately 0.1 mm) of gold. Lab analysis showed the sample concentrates contained 2,411 ppb gold and 55 ppm copper.
Latitude N 61° 20' 44.760"; Longitude W 143° 33' 49.245"; Elevation 880 ft.
Estimated location:
Latitude N 61° 21' 01"; Longitude W 143° 31' 44"; Elevation 2,100 ft.

References:

Bibliography:

ALASKA KARDEX 87-188

Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 14, 66.

CAVE PROSPECT

MAS no: 0020860192 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Company name(s):
Adolph Ammann
Mineral survey(s):

Commodity: Copper, silver
Deposit type: Basaltic Cu

Location: At approximately the 4,135 ft. elevation, southwest of the Mullen Prospect, on the west side of Copper Creek, a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 007 E. *Section:* 25
Quadrangle: Valdez C-1 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:

1907 - Staked by Scott Simenstad and E.W. Hundley (KX 86-064).
1916 - Staked by Robert Jenkins (KX 86-148).
1944 - A 223 ft. long adit (Van Alstine and Black, 1946).

Operating data:

A 223 ft. long adit trending S. 88° W. (Van Alstine and Black, 1946).

Geologic setting:

Bedrock consist of Nikolai Greenstone overlain by Chitistone Limestone which strikes N. 40° W. and dips 25° SW. A mineralized 2- to 12-in.-thick shear zone contains sheared greenstone, quartz, malachite, bornite, and minor chalcopyrite. The shear zone strikes N. 14° W. and dips 7° W. (Van Alstine and Black, 1946).

Recent investigations:

USGS/USBM/BLM work:

BLM

Located and sampled Adit No. 1 during 1997.
Located Adit No. 2 and No. 3, but sampled only Adit No. 2 during 1998.

Adit No. 1

Adit open, driven N. 35° W., for 34 ft. where it is then partially flooded. The adit is driven for another 30 to 50 ft., but is inaccessible due to the flooding. A shear zone located on the north rib of the adit, 10 ft. in from the portal, contains malachite and azurite bearing quartz.

A grab sample (**AAWSE 10043**) collected from the 2- to 12-in.-wide quartz shear zone contained 16.95% copper, 30.6 ppm silver, and 533 ppb gold.

Latitude N 61° 40' 18.381"; Longitude W 144° 04' 02.402"; Elevation 4,110 ft.

Adit No. 2

Adit open, driven S. 78° W. following a shear zone for 15 ft. Driven in malachite and azurite stained Chitistone Limestone.

A select sample (**AAWSE 10107**) collected from the stained limestone at the face of the adit contained 817 ppm copper.

Latitude N 61° 40' 20.403"; Longitude W 144° 04' 14.415"; Elevation 4,350 ft.

Adit No. 3

Adit open, driven into the Chitistone Limestone forming a vertical cliff. The adit is in a location that can only be reached with the use of ropes.

No samples were collected.

Estimated location:

Latitude N 61° 40' 11"; Longitude W 144° 04' 01"; Elevation 4,450 ft.

Opencut

A small opencut is located on top of the ridge above Adit No. 2. Dug into the Chitistone Limestone. No visible copper mineralization was noted.

No samples were collected.

Latitude N 61° 40' 25.177"; Longitude W 144° 04' 15.303"; Elevation 4,400 ft.

References:

Bibliography:

ALASKA KARDEX 86-64 (Partial)

ALASKA KARDEX 86-148 (Partial)

Moffit, F.H., and Mertie, J.B., Jr., 1923, The Kotsina-Kuskulana district, Alaska: U.S. Geological Survey Bulletin 745, p. 102-103.

Van Alstine, R.E., and Black, R.F., 1946, Copper deposits of the Kotsina-Kuskulana district, Alaska: U.S. Geological Survey Bulletin 947-G, p. 129-130.

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Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 1, 10-11, 15, 17, 19, 67-68.

CHOKOSNA RIVER

MAS no: 0020870144 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Broken Leg Group
Mineral King Group
Company name(s):
Mt. Wrangell Copper Co.
Mineral survey(s):

Commodity: Copper
Deposit type: Unknown

Location: At approximately the 2,790 ft. elevation on the west side of a tributary of the Gilahina River.

Township: 005 S. *Range:* 010 E. *Section:* 09
Quadrangle: McCarthy B-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Exploration prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1919 - Claims staked (KX 87-107).

Operating data:
None reported.

Geologic setting:
Bedrock consists of the Nikolai Greenstone intruded by granodiorite plutons.

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for but not located during 1997 and 1998.
Bedrock consists of Nikolai Greenstone.
Estimated location:
Latitude N 61° 26' 58"; Longitude W 143° 38' 02"; Elevation 2,790 ft.

References:

Bibliography:
ALASKA KARDEX 87-107

Heiner, L.E., Wolff, E.N., and Grybeck, D., 1971, Copper mineral occurrences in the Wrangell Mt. - Prince William Sound area, Alaska: Mineral Industry Research Laboratory Report 27, p. 64.

Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 14, 70.

COPPER KING MINE

MAS no: 0020860140 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Hubbard and Elliott
Mineral King
Swazie
Elliott Creek

Company name(s):
Elliott Hubbard Mining Co.
Hubbard-Elliott Copper Mines Development Co. of Alaska
Mineral King Mining Co.

Commodity: Gold, copper
Deposit type: Basaltic Cu

Mineral survey(s):
M.S. 566

Mineral certificate(s):
00000015

Location: Located at the 4,705 ft. elevation near the headwaters of Elliott Creek on the south side of the creek. Elliott Creek is a northern tributary of the Kotsina River.

Township: 003 S. *Range:* 008 E. *Section:* 06
Quadrangle: Valdez C-1 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Past producer/Patented

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:

1899 - Fifty-six claims staked by H.C. Elliott, Charles Hubbard, Bertha Huntley, John Fay, and Helen H. Nickolson (KX 86-050).
- Eighty-four claims staked by H.C. Elliott and Charles Hubbard (KX 86-051).

1900 - Copper King and the Mineral King claims located, August 26, by Charles G. Hubbard, George J. Roberts, P.J. Boardman, Ernest Brundett, Henry P. Elliott, and Antoinette Elliott.
- Claims recorded September 27.

1902 - Mineral Survey 566 surveyed, June 26-July 4 for Charles G. Hubbard, George J. Roberts, P.J. Boardman, Ernest Brundett, Henry P. Elliott, and Antoinette Elliott. Claims include the Copper King and Mineral King Lodes.

Operating data:

1902 - Mineral Survey 566 reported a discovery cut and an opencut.

Copper Creek claim
One opencut.

Mineral King claim
Several opencuts and one adit (See below).

Geologic setting:

Most of the lower part of the creek is occupied by the Nikolai Greenstone and overlain by the Chitistone Limestone. Outcrops of the limestone are not conspicuous on the south side of the valley, but on the north side and at the head of the valley form bold high cliffs. Thin-bedded Triassic limestone and shale occurs locally within the Chitistone Limestone. The Jurassic Kotsina Conglomerate caps the northern ridge while tuffs and basalts cap the southern ridge. Quartz diorite porphyry dikes occasionally cut the northern rocks. Faulting has occurred in the rocks with fracturing and faulting more pronounced in the greenstones. These fault and fracture zones have been mineralized by copper-bearing solutions. Bornite, chalcopyrite, and or chalcocite is deposited as either irregular veins, replacement ore, or disseminated in the country rock. Gangue consists of quartz, calcite, and epidote (Moffit and Mertie, 1923).

Copper King claim

Mixture of bornite and chalcocite along a shear zone. Minor pyrite, malachite, and chalcanthite (blue glass) are located along the shear zone. The shear zone runs east-northeast, parallel to the limestone bluffs, and dips southward (Moffit and Mertie, 1923).

Mineral King claim

A shear zone, striking N. 35° E., dipping 30° S., showing a number of faults. Vertical joints, striking N. 60° E., and faults that dip 30° SE., cross the greenstone. A mixture of bornite and chalcocite has replaced the greenstone, particularly along the joint and fracture planes. The mineralized rock ranges up to 6 ft. wide and can be traced for up to 30 ft. (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:

BLM

Located one adit and collected one sample during 1997.

Revisited in 1998 with the mine owner.

Mineral King Lode

Located an adit that was snow covered and iced in at the portal. The adit appeared to be driven N. 32° E. Massive chalcocite, bornite, chalcopyrite, malachite, and azurite was noted in the waste dump.

A select sample (**AAWSE 10063**) collected from the waste dump contained 13.4% copper, 17.2 ppm silver, 16 ppb gold, and 1,105 ppm manganese.

Latitude N 61° 38' 12.130"; Longitude W 144° 02' 03.251"; Elevation 4,700 ft.

Opencut No. 1

Opencut dug into Nikolai Greenstone. Chalcocite, bornite, chalcopyrite, malachite, and azurite was noted in the outcrops in the opencut.

No samples collected.

Latitude N 61° 38' 20.769"; Longitude W 144° 02' 09.226"; Elevation 4,610 ft.

Opencut No. 2

Opencut 15 ft. long, 5 ft. wide, and 3 ft. deep. No bedrock encountered.

No samples collected.

Latitude N 61° 38' 20.988"; Longitude W 144° 02' 06.649"; Elevation 4,635 ft.

Opencut No. 3

Opencut 15 ft. long, 5 ft. wide, and 3 ft. deep. No bedrock encountered. No samples collected.

Latitude N 61° 38' 21.053"; Longitude W 144° 02' 06.360"; Elevation 4,640 ft.

Opencut No. 4

Opencut 15 ft. long, 5 ft. wide, and 3 ft. deep. No bedrock encountered. No samples collected.

Latitude N 61° 38' 21.123"; Longitude W 144° 02' 05.825"; Elevation 4,640 ft.

Camp

All buildings, but one, are collapsed at the camp in the valley. Remnants of a collapsed building with an engine is located just below adit.

References:

Bibliography:

ALASKA KARDEX 86-050

ALASKA KARDEX 86-051

Moffit, F.H., and Knopf, A., 1910, Mineral resources of the Nabesna-White River district, Alaska, with a section on the Quaternary, by S.R. Capps: U.S. Geological Survey Bulletin 417, p. 55-56.

Moffit, F.H., and Mertie, J.B., Jr., 1923, The Kotsina-Kuskulana district, Alaska: U.S. Geological Survey Bulletin 745, p. 116-117, 122-123.

Cobb, E.H., and Matson, N.A., Jr., 1972, Metallic mineral resources map of the Valdez quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-438, no. 69.

U.S. Bureau of Mines, 1978, Mineral appraisal of the Wrangell-St. Elias region: A summary report: U.S. Bureau of Mines Open-File Report 64-78, p. 33.

Winkler, G.R., Miller, R.J., MacKevett, E.M., Jr., and Holloway, C.D., 1981, Map and summary table describing mineral deposits in the Valdez quadrangle, southern Alaska: U.S. Geological Survey Open-File Report 80-892-B, no. 56.

Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 1-2, 7, 11, 15, 18-20, 76-79.

CRAWFORD

MAS no: 0020860125 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Bet[ween]. Copper
Crawfords Nos. 1-3
Shale Creek
Company name(s):
Mineral survey(s):

Commodity: Uranium
Deposit type: Polymetallic vein

Location: At approximately the 5,000 ft. elevation on the north side of Sheep Mtn., east of Sheep Creek, a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 007 E. *Section:* 14
Quadrangle: Valdez C-1 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Raw prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1955 - Fourteen claims staked by C.C. Cechowski (KX 86-028).
- Six claims staked by Roland Wainer (KX 86-029).
- Three claims staked by Ben Crawford (KX 86-030).
- Three claims staked by Richard Kennard (KX 86-031).

Operating data:
None reported.

Geologic setting:
Bedrock consists of pebble conglomerate.

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for but not located during 1997 and 1998.
No visible signs of workings were noted in 1998. Bedrock consists of pebble conglomerate with aplitic, biotitic, and epidote dikes generally trendsoutheast - northwest. Pebbles include basalt, quartz, epidote, calcite, with a graywacke matrix.
Scintillation counter readings of the conglomerate showed no readings above background levels.

Estimated location:
Latitude N 61° 41' 28"; Longitude W 144° 05' 41"; Elevation 4,400 ft.

References:

Bibliography:

ALASKA KARDEX 86-028
ALASKA KARDEX 86-029
ALASKA KARDEX 86-030
ALASKA KARDEX 86-031

Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 15, 84.

DIVIDE CREEK

MAS no: 0020860196 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Canyon Creek
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: Located between the 4,700 and 4,820 ft. elevation on the south side of Divide Creek, a northern tributary of Canyon Creek. Canyon Creek is a eastern tributary of the Copper River.

Township: 006 S. *Range:* 006 E. *Section:* 11
Quadrangle: Valdez B-1 *Meridian:* Copper River
Mining district: Nizina *Mineral status:* Development prospect

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1900 - Lode claims staked (KX 86-135).

Operating data:
Three opencuts.

Geologic setting:
Bedrock consists of fractured Skolai Group greenstones associated with altered sedimentary beds which include slate, schist, and highly siliceous thin-bedded limestone. Ore minerals include disseminated bornite, covellite, and chalcopyrite in the greenstone (Moffit, 1914).

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for, as part of Falls Creek, but not located during 1997 (Meyer and Shepherd, 1998). Located four opencuts and sampled three during 1998.

Opencut No. 1

Bedrock consists of Skolai Greenstone cut by shear zones containing up to 1-in.-wide veins of quartz and epidote. The opencut is 8 ft. wide, 12 ft. deep, and 5 ft. high at the face. Chalcopyrite, malachite, and azurite occur within the quartz veins. Collected a sample of the high grade mineralization.

A select sample (**AAWSE 10102**) collected from the quartz vein in the open cut contained 3.43% copper, 7.9 ppm silver, and 73 ppb gold.

Latitude N 61° 21' 50.641"; Longitude W 144° 16' 37.169"; Elevation 4,550 ft.

Opencut No. 2

Bedrock consists of highly iron-oxide stained Skolai Greenstone cut by 1-in.-wide quartz veins. The opencut is 5 ft. wide, 3 ft. long, and 5 ft. high at the face. Disseminated and veinlets of pyrite occur within the quartz and bedrock.

A select sample (**AAWSE 10103**)collected of the quartz vein contained 242 ppm copper, 0.4 ppm silver, and 23 ppb gold.

Latitude N 61° 21' 51.578"; Longitude W 144° 16'39.437"; Elevation 4,560 ft.

Opencut No. 3

Bedrock consists of highly iron-oxide stained Skolai Greenstone cut by shear zones containing 1-in.-wide quartz veins. The opencut is T-shaped with the longest dimension 15 ft. long. Chalcopyrite, pyrite, malachite, and azurite occur within the shear zone and as disseminations within the bedrock.

A select sample (**AAWSE 10104**) collected of the quartz vein contained 1.99% copper, 10.6 ppm silver, and 98 ppb gold.

Latitude N 61°21'49.081"; Longitude W 144°16'40.560"; Elevation 4,600 ft.

Opencut No. 4

Bedrock consists of Skolai Greenstone.

No samples were collected. No visible copper mineralization was noted in the opencut.

Latitude N 61°21'49.760"; Longitude W 144°16'39.524"; Elevation 4,575 ft.

References:

Bibliography:

ALASKA KARDEX 86-135

Moffit, F.H., 1912, The Taral and Bremner River districts, *in* Brooks, A.H., and others, Mineral resources of Alaska, report on progress of investigations in 1911: U.S. Geological Survey Bulletin 520, p. 103.

Moffit, F.H., 1914, Geology of the Hanagita-Bremner region, Alaska: U.S. Geological Survey Bullctin 576, p. 52.

Berg, H.C., and Cobb, E.H., 1967, Metalliferous lode deposits of Alaska: U.S. Geological Survey Bulletin 1246, p. 63.

Heiner, L.E., Wolff, E.N., and Grybeck, D., 1971, Copper mineral occurrences in the Wrangell Mt. - Prince William Sound area, Alaska: Mineral Industry Research Laboratory Report 27, p. 103.

Cobb, E.H., and Matson, N.A., Jr., 1972, Metallic mineral resources map of the Valdez quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-438, no. 59.

MacKevett, E.M., Jr., and Holloway, C.D., 1977, Table describing metalliferous and selected nonmetalliferous mineral deposits in eastern southern Alaska: U.S. Geological Survey Open-File Report 77-169A, p. 81.

Winkler, G.R., Miller, R.J., MacKevett, E.M., Jr., and Holloway, C.D., 1981, Map and summary table describing mineral deposits in the Valdez quadrangle, southern Alaska: U.S. Geological Survey Open-File Report 80-892-B, no. 50.

Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 91-93.

DOTTIE

MAS no: 0020860127 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Dottie and Danny
Hjalmer Nos. 1-2
Johnson Nos. 1-4
Left Limit Kotsina River
Right Limit Copper Creek
Company name(s):
Mineral survey(s):

Commodity: Gold
Deposit type: Placer

Location: At approximately the 2,100 ft. elevation of the northern braid of the Kotsina River near the mouth of Copper Creek.

Township: 002 S. *Range:* 007 E. *Section:* 12
Quadrangle: Valdez C-1 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Exploration prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1955 - Two claims staked by Mark Kennard (KX 86-032).
- Two claims staked by Vern Johnson (KX 86-033).
- Two claims staked by Pauline Johnson (KX 86-034).
- Two claims staked by Roland Wainer (KX 86-035).
- Two claims staked by C.C. Cechowski (KX 86-036).

Operating data:
None reported.

Geologic setting:
Bedrock in the area includes limestones, greenstones, diorites, gniess, sandstone, and conglomerates.

Recent investigations:

USGS/USBM/BLM work:
BLM
Not looked for during 1997.
Looked for but not located during 1998.

Estimated location:
Latitude N 61° 42' 53"; Longitude W 144° 03' 31"; Elevation 2,100 ft.

References:

Bibliography:

ALASKA KARDEX 86-032
ALASKA KARDEX 86-033
ALASKA KARDEX 86-034
ALASKA KARDEX 86-035
ALASKA KARDEX 86-036

Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 15, 85-86.

ESCAPE

MAS no: 0020870078 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Escape 1-3
Company name(s):
Mineral survey(s):

Commodity: Gold
Deposit type: Placer

Location: At approximately the 1,480 ft. elevation of the Chokosna River upstream from the community of Chokosna.

Township: 005 S. *Range:* 009 E. *Section:* 10
Quadrangle: McCarthy B-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Exploration prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1971 - Three claims staked by Don Shepard (KX 87-158).

Operating data:
None reported.

Geologic setting:
Bedrock in the area includes limestones, greenstones, diorites, gniess, sandstone, and conglomerates

Recent investigations:

USGS/USBM/BLM work:
BLM
Not looked for during 1997.
Looked for but not located during 1998.
In flying over the Chokosna River no landing zones were noted along the river banks. The brush is too thick. Also encountered numerous homesteads along the lower course of the river, so sampling without disturbing owners was not feasible.
Estimated location:
Latitude N 61° 27' 22"; Longitude W 143° 45' 41"; Elevation 1,480 ft.

References:

Bibliography:

ALASKA KARDEX 87-158

Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 14, 87.

FALL CK SADDLE OCCURRENCE

MAS no: 0020870148 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Fall Creek
Kluvesna Creek
Long Glacier
Trail Creek
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Unknown

Location: At the 6,000 ft. elevation on the saddle between Trail Creek, a western tributary of Fall Creek, and Long Glacier, northwestern tributaries of the Kotsina River.

Township: 001 S. *Range:* 008 E. *Section:* 04
Quadrangle: McCarthy D-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Raw prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
Unknown.

Operating data:
None reported.

Geologic setting:
Bedrock consists of sheared and iron-oxide stained Nikolai Greenstone.

Recent investigations:

USGS/USBM/BLM work:
BLM
Located and sampled during 1998.

Mineralization occurs within a 2-ft.-wide shear zone along the contact between the Nikolai Greenstone and an iron-oxide stained basalt. The malachite and iron-oxide stained shear zone strikes N. 10° W. with a near vertical dip. Disseminated bornite and malachite occur within the quartz and epidote veining.

A select sample (**AAWSE 10088**) collected from the shear zone contained 3,769 ppm copper, 0.6 ppm silver, and 25 ppb gold.
Latitude N 61° 48' 23"; Longitude W 143° 58' 08"; Elevation 6,050 ft.

References:

Bibliography:

FALL CREEK UPPER PROSPECT

MAS no: 0020870149 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Fall Creek
Kluvesna Creek
Trail Creek
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: At the 5,300 ft. elevation on the north side of Trail Creek, a western tributary of Fall Creek, a northwestern tributary of the Kotsina River.

Township: 001 S. *Range:* 008 E. *Section:* 10
Quadrangle: McCarthy D-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
Unknown.

Operating data:
None reported.

Geologic setting:
Bedrock consists of sheared and highly iron-oxide stained Nikolai Greenstone containing quartz.

Recent investigations:

USGS/USBM/BLM work:
BLM
Located and sampled during 1998.
Opencut
An opencut driven along a highly iron-oxide stained 3-ft.-wide shear zone within the Nikolai Greenstone. The opencut is 10 ft. wide, 25 ft. deep, and 20 ft. high at the face. Bornite, chalcopyrite, pyrite, malachite, and azurite occur within quartz and epidote veining. The mineralized zone covers an area of approximately 30 sq. ft. along length of opencut.
A select sample (**AAWSE 10087**) collected from the shear zone contained 1.94% copper, 6.4 ppm silver, and 6 ppb gold.
Latitude N 61° 47' 48.858"; Longitude W 143° 56' 24.106"; Elevation 5,270 ft.

References:

Bibliography:

FALLS CREEK

MAS no: 0020860105 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Canyon Creek
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: Located at the 4,695 ft. elevation on the south side of Falls Creek cirque. Falls Creek is a northern tributary of Canyon Creek. Canyon Creek is an eastern tributary of the Copper River.

Township: 006 S. *Range:* 006 E. *Section:* 13
Quadrangle: Valdez B-1 *Meridian:* Copper River
Mining district: Nizina *Mineral status:* Development prospect

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1911 - One opencut and two tunnels driven on the south side of Falls Creek (Moffit, 1914).

Operating data:
Two tunnels, 105 ft. and 150 ft. long, one opencut (Moffit, 1914).

Geologic setting:
Bedrock consists of fractured Skolai Greenstone associated with altered sedimentary beds which include slate, schist, and highly siliceous thin-bedded limestone. Ore minerals include disseminated bornite, covellite, and chalcopyrite in the greenstone (Moffit, 1914).

Recent investigations:

USGS/USBM/BLM work:
BLM
Located two adits and sampled one during 1997.
Located No. 2 Adit during 1998.
No. 1 Adit
Adit is 149 ft. long, driven N. 40° E. for 29 ft. then N. 88° E. for 120 ft. A crosscut driven 15 ft. north is located 65 ft. from the portal. A shear zone at the portal extends at least 100 ft. at a 45° angle to the left. Malachite, azurite, chalcopyrite, and bornite occur within the Skolai Greenstone.
A select sample **(AAWSE 10064)** collected from the waste dump contained 6.2% copper, 6.2 ppm silver, and 329 ppb gold.
Latitude N 61° 21' 13.668"; Longitude W 144° 15' 38.732"; Elevation 4,780 ft.

No. 2 Adit

Adit is driven along a shear zone S. 3° W. for 100 ft. Bedrock consists of highly sheared and fractured Skolai Greenstone with quartz and epidote veining. The adit did not encounter any visible copper mineralization.

No samples were collected. No visible copper mineralization noted in the adit or waste dump.

Latitude N 61° 21' 16.925"; Longitude W 144° 16' 14.674"; Elevation 4,620 ft.

No. 3 Adit

Adit is driven N. 40° W. for 10 ft., was located on the north side of the valley. The adit is driven into limestone and greenschist. The adit did not encounter any visible copper mineralization.

No samples were collected, no copper mineralization noted in the waste dump or surrounding area.

Latitude N 61° 21' 30.147"; Longitude W 144° 15' 40.455"; Elevation 4,710 ft.

Opencut

Trench cut approximately 15 ft. long, 3 ft. wide, and 3 ft. deep into glacial till. The opencut did not expose any visible bedrock or copper mineralization.

No samples were collected. No visible copper mineralization noted.

Latitude N 61° 21' 22.103"; Longitude W 144° 16' 11.878"; Elevation 4,360 ft.

Mineralized boulder

A mineralized boulder located northeast from Adit No. 1 is deposited in the cirque. This boulder, along with at least four others, weas derived from a shear zone located to the north of the No. 1 Adit. Malachite, azurite, and iron-stained quartz containing disseminated pyrite and chalcopyrite made up the boulder.

A select sample (**AAWSE 10065**) collected from the boulder contained 1,733 ppm copper, 0.5 ppm silver, and 22 ppb gold.

Latitude N 61° 21' 16"; Longitude W 144° 15' 32"; Elevation 4,560 ft.

Camp

All the camp buildings in the lower part of the cirque are collapsed.

References:

Bibliography:

ALASKA KARDEX 86-137

Moffit, F.H., 1912, The Taral and Bremner River districts, *in* Brooks, A.H., and others, Mineral resources of Alaska, report on progress of investigations in 1911: U.S. Geological Survey Bulletin 520, p. 102-103.

Moffit, F.H., 1914, Geology of the Hanagita-Bremner region, Alaska: U.S. Geological Survey Bulletin 576, p. 52.

Berg, H.C., and Cobb, E.H., 1967, Metalliferous lode deposits of Alaska: U.S. Geological Survey Bulletin 1246, p. 62-63.

Cobb, E.H., and Matson, N.A., Jr., 1972, Metallic mineral resources map of the Valdez quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-438, no. 60.

MacKevett, E.M., Jr., and Holloway, C.D., 1977, Table describing metalliferous and selected non-metalliferous mineral deposits in eastern southern Alaska: U.S. Geological Survey Open-File Report 77-169A, p. 81.

Winkler, G.R., Miller, R.J., MacKevett, E.M., Jr., and Holloway, C.D., 1981, Map and summary table describing mineral deposits in the Valdez quadrangle, southern Alaska: U.S. Geological Survey Open-File Report 80-892-B, no. 51.

Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 11, 15, 18-19, 91-93.

FORGET-ME-NOT

MAS no: 0020860197 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Forget-me-not claim
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: At the 4,680 ft. elevation on the west side of the Middle Fork Copper Creek, a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 008 E. *Section:* 30
Quadrangle: Valdez C-1 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1922 - Prospecting done (Moffit and Mertie, 1923).

Operating data:
One small opencut (Moffit and Mertie, 1923).

Geologic setting:
Irregular fracture zones in the Nikolai Greenstone near the contact with the Chitistone Limestone. Chalcopyrite and minor bornite are disseminated in the greenstone, with malachite coating the fractures (Moffit and Mertie, 1923; Van Alstine and Black, 1946).

Recent investigations:

USGS/USBM/BLM work:
BLM
Located and sampled during 1998.
Workings consist of a small opencut in sheared and iron-oxide stained Nikolai Greenstone. The shear zone is 3 ft. wide, striking N. 65° W., dipping steeply south, and extending for 20 to 30 ft. up slope and 40 ft. across slope. This shear zone appears to be a continuation of the shear zone that occurs at the Bluebird and Montana Boy occurrences further up the ridge. The Bluebird prospect is visible from Forget-Me-Not prospect. The shear zone contains quartz and calcite veins and is malachite stained. Chalcocite, bornite, chalcopyrite, pyrite, and malachite occur within the shear zone. A possible opencut occurs to the south (southern extension) at the 4,680 ft. elevation, containing malachite staining. This mineralization is in an area too dangerous to attempt to sample.

A select sample (**AAWSE 10105**) collected across the 3-ft.-wide shear zone contained 1.89% copper and 3.2 ppm silver.
Latitude N 61° 39' 44.654"; Longitude W 144° 02' 09.822"; Elevation 4,750 ft.

References:

Bibliography:

Moffit, F.H., and Mertie, J.B., Jr., 1923, The Kotsina-Kuskulana district, Alaska: U.S. Geological Survey Bulletin 745, p. 103.

Van Alstine, R.E., and Black, R.F., 1946, Copper deposits of the Kotsina-Kuskulana district, Alaska: U.S. Geological Survey Bulletin 947-G, p. 130-131.

Cobb, E.H., and Kachadoorian, R., 1961, Index of metallic and nonmetallic mineral deposits of Alaska compiled from published reports of Federal and State agencies through 1959: U.S. Geological Survey Bulletin 1139, p. 333.

Berg, H.C., and Cobb, E.H., 1967, Metalliferous lode deposits of Alaska: U.S. Geological Survey Bulletin 1246, p. 38-39.

Heiner, L.E., Wolff, E.N., and Grybeck, D., 1971, Copper mineral occurrences in the Wrangell Mt. - Prince William Sound area, Alaska: Mineral Industry Research Laboratory Report 27, p. 103.

Cobb, E.H., and Matson, N.A., Jr., 1972, Metallic mineral resources map of the Valdez quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-438, no. 72.

Winkler, G.R., Miller, R.J., MacKevett, E.M., Jr., and Holloway, C.D., 1981, Map and summary table describing mineral deposits in the Valdez quadrangle, southern Alaska: U.S. Geological Survey Open-File Report 80-892-B, no. 58.

Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 53-54.

FRANKLIN

MAS no: 0020870150 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Franklin Lode
Franklin No. 2-3 Lode
Company name(s):
Galena Bay Mining Co.
Mineral survey(s):
M.S. 908

Commodity: Copper
Deposit type: Basaltic Cu

Patent number(s):
545933

Location: Located at the 2,800 ft. elevation on the southeast side of the Kluvesna River between Mineral Creek and the Kluvesna River. The Kluvesna River is a northern tributary of the Kotsina River.

Township: 001 S. *Range:* 008 E. *Section:* 24
Quadrangle: McCarthy D-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect/Patented

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1911 - Claims staked June 1 by the Galena Bay Mining Company. Claims surveyed for Mineral Survey 908 on October 16-17 by Lynn W. Storm.
1916 - Claims patented September 16.

Operating data:
1911 - Two tunnels and two opencuts reported (M.S. 908).

Geologic setting:
Bedrock consists of fractured Nikolai Greenstone.

Recent investigations:

USGS/USBM/BLM work:
BLM
Area located and sampled in 1998.
None of the reported adits were located. Bedrock consists of an outcrop of iron-oxide stained, highly fractured, Nikolai Greenstone which contains malachite staining along the fracture surfaces. Calcite crystals have formed within vugs along the fracture planes. Interbedded calcite and quartz are associated within the fractures. Disseminated pyrite, possible chalcopyrite, and malachite occur within the quartz as well as the greenstone.

The malachite staining is impossible to sample due to extreme steepness of rock faces. A random chip sample (**AAWSE 10076**) collected from the base of the outcrop contained 186 ppm copper.
Latitude N 61°46'12.304"; Longitude W 143°53'05.481"; Elevation 2,800 ft.

References:

Bibliography:

GOOD ENOUGH

MAS no: 0020870046 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Good Enough Group
Company name(s):
Kotsina Mining Co.
Mineral survey(s):

Commodity: Copper, silver
Deposit type: Basaltic Cu

Location: At approximately the 3,950 ft. elevation on the southeast side of Scotty Peak, along the east side of an unnamed tributary of the Kluvesna River.

Township: 001 S. *Range:* 008 E. *Section:* 22
Quadrangle: McCarthy D-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1907 - Staked by Adolph Ammann and Jack Nafsted (KX 87-032).

Operating data:
Two tunnels;

The older and longer tunnel, located on the northeast side of a deep gulch, driven 70 ft. in a northwesterly direction trough fractured greenstones. Includes one crosscut. Workings caved (Moffit and Mertie, 1923).

The newer and shorter tunnel started on the south side of the gulch (Moffit and Mertie, 1923).

Geologic setting:
Boundary of the Nikolai Greenstone and underlying Skolai Group rocks. Bedrock made up of faulted and fractured, fine-grained basalt and tuff with native copper and chalcocite associated with quartz and calcite veins. Cuprite, malachite, and azurite are also present in small quantities. Minerals form amygdules and replace the greenstone (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for but not located during 1997 and 1998.

Bedrock consists of Nikolai Greenstone forming a set of waterfalls. Just to the right, below the falls is a disturbed area along the bank. This could possibly be the location of

the workings. Noticed a coffee can lid in the stream bed just below this location. No visible copper minerals were noted in the bank or in the creek float.

Estimated location:

Latitude N 61° 46' 17"; Longitude W 143° 55' 59"; Elevation 3,950 ft.

References:

Bibliography:

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Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 14, 95-96.

HIDDEN TREASURE

MAS no: 0020870045 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Fall Creek
Company name(s):
Mineral survey(s):

Commodity: Copper, gold, silver
Deposit type: Basaltic Cu

Location: At approximately the 5,300 ft. elevation on the east side of Fall Creek, a northern tributary of Kluvesna Creek.

Township: 001 S. *Range:* 008 E. *Section:* 12
Quadrangle: McCarthy D-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1907 - Staked by Adolph Ammann and Jack Nafsted (KX 87-032).

Operating data:
Several opencuts and a tunnel (Moffit and Mertie, 1923).

Geologic setting:
Small fracture veins filled with quartz and calcite along a north-south fault within amygdaloidal Nikolai Greenstone. Bornite and chalcocite occur at the south end of the claim, chalcocite and native copper occur at the north end of the claim, and in between, chalcocite and native copper occur in the quartz veins. The tunnel sits on the south end of the claim (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for during 1997. The adit was not located but two opencuts in the cirque were located and one sampled.
Revisited the area during 1998. No workings were noted. Several cairns were noted on the ridge line southwest of the 6,050 ft. arete. Collected location data for three of the cairns.
Lower opencut
Opencut 5 ft. wide, 20 ft. long, and 5 ft. deep. Bedrock consists of vesicular Nikolai Greenstone containing bornite and malachite.
A select sample (**AAWSE 10052**) collected from the waste dump contained 3.3% copper, 3.0 ppm silver, and 12 ppb gold.

Latitude N 61° 48' 00"; Longitude W 143° 53' 04"; Elevation 5,620 ft.

Upper opencut

Opencut 5 ft. wide, 10 ft. long, and 2 ft. deep cut into the Nikolai Greenstone. No samples were collected. No visible copper mineralization was noted.

Cairn locations:

Cairn no. 1
Latitude N 61° 47' 52.853"; Longitude W 143° 53' 19.455"; Elevation 6,060 ft.
Cairn no. 2
Latitude N 61° 47' 47.095"; Longitude W 143° 53' 18.839"; Elevation 5,910 ft.
Cairn no. 3
Latitude N 61° 47' 56.374"; Longitude W 143° 52' 51.364"; Elevation 5,860 ft.

References:

Bibliography:

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Moffit, F.H., and Knopf, A., 1910, Mineral resources of the Nabesna-White River district, Alaska, with a section on the Quaternary, by S.R. Capps: U.S. Geological Survey Bulletin 417, 64 p.

Moffit, F.H., 1915, Mineral deposits of the Kotsina-Kuskulana district, with notes on mining in Chitina valley, *in* Brooks, A.H., and others, Mineral resources of Alaska, report on progress of investigations in 1914: U.S. Geological Survey Bulletin 622, p. 109.

Moffit, F.H., and Mertie, J.B., Jr., 1923, The Kotsina-Kuskulana district, Alaska: U.S. Geological Survey Bulletin 745, p. 113-114.

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Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 1, 14-15, 17, 19, 97-98.

HOMESTAKE

MAS no: 0020870015 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Fall Creek
Kluvesna Creek
Trail Creek
Company name(s):
Adolph Ammann
Mineral survey(s):

Commodity: Copper, gold, silver
Deposit type: Basaltic Cu

Location: At the 4,480 ft. elevation on the south side of the mouth of Trail Creek, a western tributary of Fall Creek, a northwestern tributary of the Kluvesna River.

Township: 001 S. *Range:* 008 E. *Section:* 10
Quadrangle: McCarthy D-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1907 - Staked by Adolph Ammann and Jack Nafsted (KX 87-32).
- Prospecting and development work done (Moffit and Maddren, 1908; Moffit and Maddren, 1909).

Operating data:
One short tunnel (Moffit and Mertie, 1923).

Geologic setting:
Vertical fault in Nikolai Greenstone stained with malachite. Native copper exposed 25 ft. above the tunnel mouth. Greenstones also contain chalcocite and the black carbonaceous copper-bearing substance (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Located and sampled during 1997.
Area reexamined and sampled in 1998.
Homestake Adit
Adit open, driven S. 75°E., for 83 ft. Two crosscuts are located, one at 40 ft. from the portal is driven west for 15 ft., and second one at 55 ft. is driven east for

30 ft. Bedrock consists of basaltic tuff containing native copper. Native copper, bornite, chalcopyrite, and malachite occur within the shear zone. The adit is driven into a zone of mineralized basaltic tuff covering an area 50 ft. high and 100 ft. wide.

A select sample (**AAWSE 10038**) collected from the waste dump contained 2.9% copper, 8.5 ppm silver, and 6 ppb gold.

Latitude N 61° 47' 31.899"; Longitude W 143° 56' 03.964"; Elevation 4,640 ft.

Upper opencut

Bedrock consists of iron-oxide stained Nikolai Greenstone. Opencut located in a gully directly above the adit. Pyrite occurs within quartz veining.

A grab sample (**AAWSE 10085**) collected of the pyrite contained 215 ppm copper and 8 ppb gold.

Latitude N 61° 47' 27.734"; Longitude W 143° 56' 12.206"; Elevation 4,690 ft.

References:

Bibliography:

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Mendenhall, W.C., and Schrader, F.C., 1903, The mineral resources of the Mount Wrangell district, Alaska: U.S. Geological Survey Professional Paper 15, p. 21.

Mendenhall, W.C., 1905, Geology of the central Copper River region, Alaska: U.S. Geological Survey Professional Paper 41, p. 97.

Moffit, F.H., and Maddren, A.G., 1908, The mineral resources of the Kotsina and Chitina valleys, Copper River region, *in* Brooks, A.H., and others, Mineral resources of Alaska, report on progress of investigations in 1907: U.S. Geological Survey Bulletin 345, p. 142-143.

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MacKevett, E.M., Jr., 1976, Mineral deposits and occurrences in the McCarthy quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-773-B, no. 181.

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HUBBARD-ELLIOTT MINE

MAS no: 0020860123 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Albert Johnson
Chance
Cliff
Copper Queen
Curtis
Discovery No. 1
Elizabeth
Goodyear
Guthrie
Henry Prather
Lawton
Leland
Lizzie G.
Louise
Marie Antoinette
Marmot
Mary Ellen
Nova Quartz
Swazie
Elliott Creek
Rainbow Creek

Commodity: Copper, gold, silver
Deposit type: Basaltic Cu

Company name(s):
Hubbard-Elliot Copper Co.
Hubbard-Elliot Copper Mines Development Co. of Alaska

Mineral survey(s):
M.S. 565
M.S. 630 through 632
(M.S. 632 included in M.S. 658)
M.S. 658 through 659
M.S. 660A&B through 662A&B
M.S. 663
M.S. 664 (Not filed)
M.S. 665A&B

Mineral certificate(s):
00000014
00000065 through 00000066
00000075 through 00000078
00000080 through 00000081

Location: Located along the entire length of the Elliott Creek valley. Elliott Creek is a northern tributary of the Kotsina River.

Township: 002 S. *Range:* 007 E. *Section:* 34
Quadrangle: Valdez C-1 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Past producer/Patented

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:

1899 - Fifty-six claims staked by H.C. Elliott, Charles Hubbard, Bertha Huntley, John Fay, and Helen H. Nickolson (KX 86-050).
- Eighty-four claims staked by H.C. Elliott and Charles Hubbard (KX 86-051).

1900 - Copper King, Louise, Goodyear, Henry Prather, Lizzie G, Mineral King, Rainbow, and Nancy Hanks claims located, August 26, by Charles G. Hubbard, George J. Roberts, P.J. Boardman, Ernest Brundett, Henry P. Elliott, and Antoinette Elliott.
- Claims recorded September 27.

1901 - Prospects reported (Schrader and Spencer, 1901).
- Elizabeth Lode located, July 16, by the Hubbard-Elliott Copper Mines Development Co. of Alaska.
- Guthrie and Albert Johnston Lodes located, July 17, by the Hubbard-Elliott Copper Mines Development Co. of Alaska.
- Claims recorded October 11.

1902 - Workings reported (Mendenhall and Schrader, 1902).
- Mineral Survey 566 surveyed, June 26-July 4 for Charles G. Hubbard, George J. Roberts, P.J. Boardman, Ernest Brundett, Henry P. Elliott, and Antoinette Elliott. Claims include the Copper King and Mineral King Lodes.
- Mineral Survey 565 surveyed, July 5-19, for Charles G. Hubbard, George J. Roberts, P.J. Boardman, Ernest Brundett, Henry P. Elliott, and Antoinette Elliott. Claims include the Louise, Goodyear, Henry Prather, Lizzie G, Rainbow, and Nancy Hanks Lodes.

1904 - Mineral Survey 630 surveyed, August 3-12, for the Hubbard-Elliott Copper Mines, Development Co. of Alaska. Claims include the Guthrie and Albert Johnston Lodes.
- Mineral Survey 631 surveyed, August 5-6, for the Hubbard-Elliott Copper Mines Development Co. of Alaska. Claim included the Elizabeth Lode.
- Copper Queen, Fortuna, Regina, Van-Dyck, Kotsina, Katherine, Frisco, California, Gloriana, Marmot, Samolean, Flanders, Castle, Retriever, Glendive, Sweepstakes, Babe, Wrangell, Cliff, Cave, Lime-Gulch, Chance, Lawton, Leland, Ralph J., Unalita, Curtis, Red Jacket, El Capitan, Senator, Marie Antoinette, and the Ophir Lodes along with the Castle, Cliff, Lawton, and El Capitan Millsites located, August 10, for the Hubbard-Elliott Copper Mines Development Co. of Alaska.
- Claims recorded September 14.
- Mineral Survey 565 Patented June 30.

1905 - Mineral Survey 658 surveyed, August 19-22, for the Hubbard-Elliott Copper Mines Development Co. of Alaska. Claims include the Copper Queen, Fortuna, Regina, Van-Dyck, Kotsina, Katherine, Frisco, California, and Gloriana Lodes.
- Mineral Survey 659 surveyed, August 27-28, for the Hubbard-Elliott Copper Mines Development Co. of Alaska. Claims include the Marmot, Samolean, and Flanders Lodes.
- Mineral Survey 660 A and B surveyed, August 28-30, for the Hubbard-Elliott Copper Mines Development Co. of Alaska. Claims include the Castle, Retriever, Glendive, Sweepstakes, Babe, and Wrangell Lodes and the Castle Millsite.

- Mineral Survey 661 A and B surveyed, August 23-25, for the Hubbard-Elliott Copper Mines Development Co. of Alaska. Claims include the Cliff, Cave, Lime-Gulch, and Chance Lodes and the Cliff Millsite.
- Mineral Survey 662 A and B surveyed, August 26, for the Hubbard-Elliott Copper Mines Development Co. of Alaska. Claims include the Lawton and Leland Lodes and the Lawton Millsite.
- Mineral Survey 663 surveyed, August 31, for the Hubbard-Elliott Copper Mines Development Co. of Alaska. Claim includes the Ralph J. Lode.
- Mineral Survey 665 A and B surveyed, September 1-4, for the Hubbard-Elliott Copper Mines Development Co. of Alaska. Claims include the Unalita, Curtis, Red Jacket, El Capitan, Senator, Marie Antoinette, and the Ophir Lodes and the El Capitan Millsite.

1906 - Development work done (Brooks, 1906).
- Mineral Surveys 630 and 631 Patented August 10.

1907 - Mineral Surveys 659 and 663 Patented March 27.
- Mineral Surveys 658 and 660A Patented April 23.
- Mineral Survey 665A Patented May 4.

1908 - Development work done (Moffit and Maddren, 1908).
1909 - Development work done (Moffit and Maddren, 1909).
1910 - Development work done (Moffit, 1910).
1911 - Mr. Elliott killed by snow slide (Moffit and Mertie, 1923).
1912 - Development work done (Moffit, 1913).
1913 - Development work done (Brooks, 1914).
1914 - Development work done (Brooks, 1915 and Moffit, 1915).
1915 - Development work done (Brooks, 1916 and Smith, 1917a).
1916 - Development work done (Smith, 1917b and Moffit, 1918).
1922 - Development work done (Brooks and Capps, 1924).

Operating data:

Albert Johnson claim

Two adits and one opencut. Upper adit is 48 ft. long. Lower adit is 1,076 ft. long, with several crosscuts (Moffit and Maddren, 1909; Moffit, 1913; Moffit and Mertie, 1923).

Chance claim

One opencut (Moffit and Maddren, 1909).

Cliff claim

Two opencuts (Moffit and Maddren, 1909).

Copper Queen claim

One opencut (Moffit and Maddren, 1909).

Curtis claim

One adit 12 ft. long Moffit and Mertie, 1923).

Elizabeth claim

One adit, 250 ft. long, with several crosscuts and two opencuts (Moffit and Maddren, 1909; Moffit and Mertie, 1923).

Goodyear claim

One adit, 300 ft. long, with several crosscuts and one opencut (Mendenhall and Schrader, 1902; Moffit and Mertie, 1923).

Guthrie claim

One adit, length unknown (Moffit and Maddren, 1909).

Harry Prather claim

One opencut (Moffit and Maddren, 1909).

Leland and Lawton claims

Several opencuts (Moffit and Maddren, 1909).

Lizzie G. claim

One opencut (Moffit and Maddren, 1909).

Louise claim

One opencut (Mendenhall and Schrader, 1902).

Marie Antoinette claim

Two opencuts (Moffit and Maddren, 1909).

Mary Ellen claim

One adit, length unknown (Moffit, 1915).

Marmot claim

One opencut (Moffit and Maddren, 1909).

Swazie claim

One opencut (Moffit and Mertie, 1923).

Geologic setting:

Most of the lower part of the creek is occupied by the Nikolai Greenstone and overlain by the Chitistone Limestone. Outcrops of the limestone are not conspicuous on the south side of the valley, but on the north side and at the head of the valley form bold, high cliffs. Thin-bedded Triassic limestone and shale occurs locally within the Chitistone Limestone. The Jurassic Kotsina Conglomerate caps the northern ridge while tuffs and basalts cap the southern ridge. Quartz diorite porphyry dikes occasionally cut the northern rocks. Faulting has occurred in the rocks with fracturing and faulting more pronounced in the greenstones. These fault and fracture zones have been mineralized by copper-bearing solutions. Bornite, chalcopyrite, and/or chalcocite is deposited as either irregular veins, replacement ore, or disseminated in the country rock. Gangue consists of quartz, calcite, and epidote (Moffit and Mertie, 1923).

Albert Johnson claim

Faulted greenstone intruded by diorite porphyry dikes. Upper adit driven along a shear zone. Sulfide-bearing minerals occur as veins and replacement deposits which include bornite and chalcopyrite with associated quartz, epidote, and calcite gangue. Lower adit driven N. 25° E. to intersect a shear zone 300 ft. from the portal. The shear zone contains bornite and chalcopyrite along the fracture planes and associated calcite. Crosscuts were driven following two sets of shear zones. One shear zone trends S. 20° E., and the other trends N. 20 to 30° W. At 850 ft., native copper was encountered in the fractured greenstone (Moffit and Mertie, 1923).

Chance claim

Limestone capping the greenstone. Bornite occurs within the greenstone (Moffit and Mertie, 1923).

Cliff claim

Faulted and sheared iron-oxide stained greenstone. Faults trend east-west, dipping 45° N. Copper sulfide minerals are exposed along joint planes (Moffit and Mertie, 1923).

Copper Queen claim

Greenstone with intersecting veins of pyrite and/or chalcopyrite (Moffit and Mertie, 1923).

Curtis claim

Sheared greenstone mineralized with pyrite and highly stained with iron hydroxide. Two shear zones that strike N. 15° W. with dips of 30° W. and 80° NE. Gold and silver reported from the shear zones (Moffit and Mertie, 1923).

Elizabeth claim

Faulted and broken greenstone. Faults strike N. 50° W., N. 50° E., N. 20° E. with near vertical dips. Bornite and chalcopyrite occur in quartz veins following the fractures (Moffit and Mertie, 1923).

Goodyear claim

Greenstone with veins containing pyrite, chalcopyrite, and bornite with associated calcite and quartz (Moffit and Mertie, 1923).

Guthrie claim

Shattered greenstone cut by veins containing bornite and chalcopyrite with associated quartz, calcite, and epidote. Near the portal a 1-in.-thick mineralized vein strikes N. 50° W. (Moffit and Mertie, 1923).

Henry Prather claim

North-south fault dipping 60° W. is intersected by two parallel faults striking N. 40° E. and dipping 25 to 30° W. One fault contains a 5 ft. wide by 30 ft. long lenticular mass of weathered greenstone. Chalcopyrite and bornite occur in veins of calcite, from 8 to 12 in. thick, cut by small faults (Moffit and Mertie, 1923).

Lawton claim

Faulted greenstone in contact with the Kotsina Conglomerate and a large porphyritic dike that separates them. A fault between the greenstone and the 30 to 35 ft. wide dike strikes N. 30° W. and dips 50 to 60° S. Pyrite and chalcopyrite associated with the dike (Moffit and Mertie, 1923).

Leland claim

Faulted greenstone in contact with the Kotsina Conglomerate and a large porphyritic dike that separates them. Pyrite and chalcopyrite associated with the dike (Moffit and Mertie, 1923).

Lizzie G. claim

Sheared and plicated greenstone filled with quartz and calcite. Chalcopyrite occurs in 2-in.-wide quartz veins, with bornite and chalcopyrite in calcite-greenstone veins (Moffit and Mertie, 1923).

Louise claim

Faulted and jointed greenstone. Fault strikes N. 20° W. and dips 45 to 50° W. Bornite and chalcopyrite occur in calcite and quartz veins up to 2 in. thick. Veins exposed for 30 ft. horizontally (Moffit and Mertie, 1923).

Marie Antoinette claim

Shattered and faulted iron-oxide stained greenstone. Copper sulphide minerals occur in calcite veins following joint or slip planes. Largest vein strikes N. 30° W. (Moffit and Mertie, 1923).

Marmot claim

Broken and faulted greenstone. Fault strikes N. 60° W. and dips vertically. Pyrite and malachite occur in calcite veins (Moffit and Mertie, 1923).

Swazie claim

Shattered iron-oxide stained greenstone in contact with limestone along a north-south fault. Limestone contains pyrite, chalcopyrite, bornite, malachite, azurite, and gold (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:

BLM

Located two adits on Rainbow Creek during 1998.

Upper Adit

Adit open, driven N. 15° E. for 30 ft. along a mineralized shear zone. At the end of the adit a shaft was located to the left. At approximately 20 ft. from the portal, two crosscuts were made. The left crosscut is driven N. 78° W. for 20 ft., while the right crosscut is driven N. 30° W. for 40 ft.

No samples collected.

Latitude N 61° 39' 00.946"; Longitude W 144° 06' 06.639"; Elevation 4,020 ft.

Lower Adit

Adit open, driven N. 20° W. along a mineralized shear zone. The adit is sloughed at 20 ft. from the portal.

No samples were collected.

Latitude N 61° 39' 00.241"; Longitude W 144° 06' 04.936"; Elevation 3,955 ft.

References:

Bibliography:

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ALASKA KARDEX 86-051

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KINNEY-GOLDEN

MAS no: 0020870074 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Golden Creek
Kinney Golden 1-7
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: At approximately the 4,200 ft. elevation between two tributaries of the Chokosna River, south of Kuskulana Pass.

Township: 004 S. *Range:* 010 E. *Section:* 20
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1900 - Seven claims staked (KX 87-053).
1916 - Development work done (Moffit, 1918).

Operating data:
1916 - A 200 ft. long tunnel at the 4,200 ft. elevation and several opencuts (Moffit, 1918).

Geologic setting:
Contact of interbedded Triassic shale and limestone with Carbonaceous (?) lava flows. Two parallel faults striking east and dipping south, 500 ft. apart, brought the shale into contact with the Nikolai Greenstone and Chitistone Limestone. Chalcopyrite occurs along the greenstone-limestone contact (Moffit, 1918).
No ore body was discovered at this location (Berg and Cobb, 1967).

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for but not located during 1997 and 1998.
Two samples collected from the area during 1998.
Bedrock consists of a slight iron-oxide stained buff colored diorite with epidote. The staining occurs along the fractures as well as on the surface of the diorite. The diorite is overlain by alternating layers of basalts, limestones, and bedded shales of the Skolai Group. The bedded shales range from ⅛ to 5 in. thick. Also noted nice round plagioclase

inclusions up to ¼ in. in diameter occur in the basalts. Disseminated pyrite occurs within the basalts and the bedded shales, with the shales containing up to ¼ in. blebs in the thicker beds.

A select sample (**AAWSE 10083**) collected of pyritic basalt with plagioclase from an outcrop contained 61 ppm copper.

Latitude N 61° 30' 46.422"; Longitude W 143° 37' 43.421"; Elevation 3,920 ft.

A select sample (**AAWSE 10084**) collected of the pyritic bedded shale contained 46 ppm copper and 0.2 ppm silver.

Latitude N 61° 30' 44.497"; Longitude W 143° 37' 44.722"; Elevation 4,050 ft.

Estimated location:

Latitude N 61° 30' 33"; Longitude W 144° 38' 00"; Elevation 4,200 ft.

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LARSON

MAS no: 0020870056 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Larson Claim
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: The Larson property consists of two adits. The Larson East adit is located at the 4,880 ft. elevation on the east side of the cirque west of Amy Creek. The Larson West adit is located at the 4,800 ft. elevation on the west side of the same cirque. Amy Creek is a southern tributary of the Kotsina River between Rock Creek and Roaring Creek.

Township: 002 S. *Range:* 008 E. *Section:* 12
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1900 - Claims staked by Thomas Larson (KX 87-039).
1922 - Development work done (Moffit and Mertie, 1923).

Operating data:
Two tunnels (Moffit and Mertie, 1923).

Geologic setting:
Amygdaloidal Nikolai Greenstone filled with quartz amygdules cut by veins and lenses of the same material. A fracture zone and the surrounding rock is stained with malachite. The zone has been traced for several hundred feet (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Located and sampled two adits and one opencut during 1997 and 1998.
Larson East Adit
Adit located on the east side of the cirque. Driven N. 65° W. for 35 ft. and then eastward for another 55 ft. A wheelbarrow containing 1 case and 1 stick of dynamite is located in the middle of the adit at 55 ft. from the portal. Bedrock consists of basalt, slightly iron-stained, containing disseminated pyrite.
Latitude N 61° 42' 08.461"; Longitude W 143° 51' 46.415"; Elevation 5,000 ft.
A select sample (**AAWSE 10051**) collected from the waste dump contained 188

ppm copper and less than 0.2 ppm silver.

Larson West Adit

Adit open, though sloughed at portal, driven S. 60° W. for 25 ft. into Nikolai Greenstone with epidote veining. No visible copper minerals were noted in the adit or in the waste dump. Adit most likely driven to intercept the mineralized shear zones trending north-south above the adit.

No samples collected. No visible copper mineralization noted.

Latitude N 61° 42' 09.139"; Longitude W 143° 52' 40.865"; Elevation 4,900 ft.

Vein above adit

A north-south trending 7-in.-wide quartz vein is located directly above the adit. The vein dips 45° W. Chalcopyrite, pyrite, and malachite occurs in the quartz.

A select sample (**AAWSE 10096**) collected from the quartz vein contained 6,714 ppm copper and 1.3 ppm silver.

Latitude N 61° 42' 09.192"; Longitude W 143° 52' 43.516"; Elevation 4,950 ft.

Larson West Opencut

Located an opencut 30 ft. north of the adit. The opencut is driven on the quartz vein which shows iron-oxide staining. Chalcopyrite, pyrite, and malachite occurs in the quartz vein.

A grab sample (**AAWSE 10097**) collected of the mineralization quartz vein contained 4,952 ppm copper, 2 ppm silver, and 6 ppb gold.

Latitude N 61° 42' 10.063"; Longitude W 143° 52' 43.918"; Elevation 4,950 ft.

Opencut location:

Latitude N 61° 42' 10.070"; Longitude W 143° 52' 43.908"; Elevation 4,950 ft.

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LIME CREEK

MAS no: 0020870080 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Bird Larsen
G & B
United Verde
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: At the 3,890 ft. elevation on the north side of Lime Creek, a tributary of Rock Creek and the Kotsina River.

Township: 002 S. *Range:* 008 E. *Section:* 15
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1900 - Two claims staked by Dick Gillencau, Joe Bell, and A.L. Barrett (KX 87-033).
1902 - Development work done (Mendenhall and Schrader, 1903).
1907 - Development work done (Moffit and Maddren, 1908).
1914 - Development work done (Moffit, 1915).
1971 - Claims staked by Joseph Taylor (KX 87-156).

Operating data:
Two tunnels and two opencuts (Moffit and Maddren, 1908).
Lower tunnel, unknown length.
Upper tunnel, 20 ft. long.

Geologic setting:
Small faults cut the Nikolai Greenstone near the contact with the Chitistone Limestone. The faults contain bornite and chalcopyrite accompanied by quartz and epidote (Moffit, 1915). The bornite occurs as lenses and irregular 1 in. lumps in the greenstone as well as fracture fillings and small lenticular veins (Moffit and Maddren, 1908).

Recent investigations:

USGS/USBM/BLM work:
BLM
Located and sampled during 1998.

Adit

Adit open, driven N. 17° W. for 15 ft. Bedrock consists of sheared Nikolai Greenstone. A 10 to 15 ft. wide iron-oxide stained shear zone is located at the portal. Massive bornite, chalcocite, chalcopyrite, malachite, and azurite occurs in the shear zone. Gangue material includes rose quartz and calcite.

A representative chip sample (**AAWSE 10071**) collected of the "high grade" ore from the shear zone at the portal contained 23.99% copper, 4.8 ppm silver, and 608 ppb gold.

Latitude N 61° 41' 33.004"; Longitude W 143° 55' 56.244"; Elevation 3,890 ft.

Base Camp

Located the base camp site. Flat area for the tent site and lots of old food tins strewn down the ravine.

Latitude N 61° 41' 31.104"; Longitude W 143° 56' 05.525"; Elevation 3,610 ft.

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LONDON AND CAPE

MAS no: 0020870090 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Trail Creek
Company name(s):
London and Cape Co.
Mineral survey(s):

Commodity: Copper, molybdenum, silver
Deposit type: Basaltic Cu

Location: At the 4,510 ft. elevation along the ridge on the west side of Trail Creek, a southern tributary of the Kuskulana River.

Township: 003 S. *Range:* 009 E. *Section:* 35
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:

1909 - Reportedly 14 claims patented by the London and Cape Co. (Moffit and Mertie, 1923).
1912 - Work had ceased on the property (Moffit and Mertie, 1923).
1919 - Supposedly staked by Theovak Wagenen - 14 claims (KX 87-48). May be confused with the War Eagle claims.

Operating data:

A 245 ft. long adit driven in an unknown direction (Moffit and Mertie, 1923).

Geologic setting:

Most of MacDougall Creek area is made up of granodiorite but the mineralized area consists of Jurassic conglomerate, sandstone, shale, Chitistone Limestone, and the overlying Triassic shales (Kuskulana Formation) (Moffit and Mertie, 1923).

The area of the adit is composed of granodiorite which has been fractured and weathered into angular fragments. The fracturing created an environment favorable for circulation of mineralized solutions, that deposited iron and copper sulfides. Minerals include pyrite and copper staining. The workings are driven to intersect an ore body beneath the ridge, but was not driven far enough. No copper mineralization was encountered (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:

BLM
Located and sampled during 1998.

Adit caved at portal, appeared to be driven S. 65° E. Bedrock consists of diorite with mica and quartz gangue which contains pyrite, chalcopyrite, bornite, and malachite. Mineralization occurs mainly as disseminations in the country rock but also as veinlets along the fractures.

A grab sample (**AAWSE 10077**) collected of mineralized material contained 105 ppm copper.

Latitude N 61° 34' 01.525"; Longitude W 143° 43' 07.402"; Elevation 4,510 ft.

Adit location:

Latitude N 61° 34' 01.141"; Longitude W 143° 43' 06.130"; Elevation 4,505 ft.

These claims and those of the War Eagle have been confused as to which were patented and part of Mineral Survey 874. The patented claims and Mineral Survey 874 are part of the War Eagle group and not the London and Cape prospect.

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Bibliography:

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LOST CABIN

MAS no: 0020870047 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Lost Cabin Extension
Lost Cabin Group
Company name(s):
Mineral survey(s):

Commodity: Copper, silver
Deposit type: Basaltic Cu

Location: Between the 3,650 and 4,200 ft. elevation south of Scotty Peak, north of The Peninsula. The Peninsula is at the junction of the Kluvesna and Kotsina Rivers.

Township: 001 S. *Range:* 008 E. *Section:* 32
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1907 - Six claims staked by Adolph Ammann and Jack Nafsted (KX 87-32).

Operating data:
Four tunnels and several opencuts (Moffit and Mertie, 1923).

Geologic setting:
Contact of the Chitistone Limestone and the Nikolai Greenstone. Mineralization occurs for several hundred feet, or less, below the contact, but also occurs near the contact. Mineralization does not occur within the limestone. Copper mineralization consists of chalcocite, bornite, and chalcopyrite, with the bornite and chalcocite disseminated in the greenstone. Bornite occurs at the lower end, as you go upward mineralization changes to chalcocite and then to chalcopyrite. Chalcopyrite stained with iron-oxides (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Located two adits and sampled one during 1998.
Upper Adit
Adit open, driven N. 17° E. for 30 ft. Bedrock consists of thin- to massive-bedded Chitistone Limestone which has been folded, faulted, and tipped vertically. The limestone in this area is interbedded with the Nikolai Greenstone. The adit is driven along a 3-ft.-wide shear zone trending N. 5° W., dipping 55° E., with

calcite, quartz, and epidote veining. Pyrite occurs along the shear zone.

A select sample (**AAWSE 10072**) collected of the limestone wall rock contained 224 ppm copper, 0.2 ppm silver, and 6 ppb gold. A select sample (**AAWSE 10073**) collected across the shear zone contained 253 ppm copper and 0.2 ppm silver.

Latitude N 61° 44' 01.510"; Longitude W 143° 59' 46.135"; Elevation 4,010 ft.

West Adit

This adit is located on the east side of the first major ravine to the west of the upper adit. An attempt was made to reach this adit from the upper adit but we were cut off by a cliff. The adit was not reached due to terrane and time constraints.

No samples were collected.

Estimated location:

Latitude N 61° 43' 56"; Longitude W 144° 00' 10"; Elevation 3,150 ft.

References:

Bibliography:

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MINERAL CREEK

MAS no: 0020870048 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Granite Mountain
Valdez Claim
Valdez Group Nos. 1-6
Valdez No. 1
Company name(s):
Mineral survey(s):

Commodity: Copper, gold, silver
Deposit type: Basaltic Cu

Location: Approximately between the 3,600 ft. and 7,100 ft. elevation of Mineral Creek on the west side of Granite Peak. Mineral Creek is a southeastern tributary of the Kluvesna River.

Township: 001 S. *Range:* 008 E. *Section:* 26
Quadrangle: McCarthy D-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:

1923 - Six claims were staked by A.L. Barrett, Ed Young, and Jake Nafsted (B745, KX 87-036).

1971 - Fifty-five claims were staked in the area by Joseph Taylor (KX 87-156).

Operating data:

Half a dozen tunnels started with the most recent on the Valdez Group claims (Moffit and Mertie, 1923).

Principle Tunnel

Driven S. 25° W. for 50 ft. and then two branches. One branch heads south for an unknown length and the other branch is driven S. 70° W. for 50 ft. The main adit follows a bedding or flow plane containing pyrite and chalcopyrite in crushed quartz and country rock (Moffit and Mertie, 1923).

Valdez No. 1 Tunnel

Located 350 ft. higher than the Principal Tunnel. Unknown length. Contains pyrite in calcite and quartz (Moffit and Mertie, 1923).

Short Tunnel

Located 200 ft. higher on the northeast side of the creek. Contains a mineralized quartz vein (Moffit and Mertie, 1923).

Two short tunnels

Located opposite the Valdez Group claims and are 75 ft. apart vertically. Unknown mineralization (Moffit and Mertie, 1923).

Short Tunnel

Located 4,600 ft. above the Kluvesna River. Contains a 18-in.-wide vein in a fault within the Nikolai Greenstone. Assay reported $60.00 per ton gold (Moffit and Mertie, 1923).

Geologic setting:

Skolai Group cherts and tuffs interbedded with lava flows striking almost north and dipping 45° E. The Skolai Group is intruded by diorite, and more basic, dark-colored fine-grained dioritic rocks, containing disseminated pyrite. The bedrock is cut by numerous faults containing quartz veins and associated pyrite, chalcopyrite, and minor chalcocite (Moffit and Mertie, 1923).

Assays of a 4-ft.-thick vein in the Principal Tunnel contained $9.75 in gold (approximately ½ oz. per ton) and 3 oz. silver per ton. One 18-in.-thick quartz vein in the highest adit assayed $60 per ton gold (approximately 3 oz. per ton) in 1923 (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:

BLM

Looked for but not located during 1998. Sample collected from area.

The head of the drainage was examined but no evidence of any of the workings were noted. Snow filled the creek bed below the 4,100 ft. elevation, thus no exploration was conducted below this elevation. Bedrock in the creek bed consists of diorite overlying basalts. The basalts contain 1- to 2-ft.-wide shear zones containing quartz veins. The surface is highly iron-oxide stained. Veinlets and disseminated chalcopyrite and pyrite occur within the shear zones.

A representative chip sample **(AAWSE 10075)** collected across the shear zone contained 1,583 ppm copper, 0.3 ppm silver, and 18 ppb gold.

Latitude N 61° 44' 55.193"; Longitude W 143° 53' 39.312"; Elevation 4,110 ft.

Estimated location:

Latitude N 61° 45' 10"; Longitude W 143° 54' 10"; Elevation 4,000 ft.

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MINNEAPOLIS

MAS no: 0020870151 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Minneapolis Lode
Company name(s):
Galena Bay Mining Co.
Mineral survey(s):
M.S. 906

Commodity: Copper
Deposit type: Basaltic Cu

Patent number(s):
552285

Location: Located approximately at the 4,750 ft. elevation on the west side of Nugget Creek, a northern tributary of the Kuskulana River.

Township: 002 S. *Range:* 009 E. *Section:* 34
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect/Patented

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1911 - One claim staked June 1, by the Galena Bay Mining Co. (M.S. 906).
- Claim surveyed October 22, by Lynn W. Storm (M.S. 906).
1916 - Patent issued, October 30.

Operating data:
1911 - One adit and two opencuts reported (M.S. 906).

Geologic setting:
Bedrock consists of Nikolai Greenstone intruded by associated tertiary plutons.

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for but not located during 1998. One sample collected in the area.
Bedrock consists of highly sheared and altered Nikolai Greenstone with quartz and epidote veins up to 5 in. thick. Mineralized area covers approximately 900 sq. ft. Disseminated bornite, malachite, and azurite occurs in the greenstone.
A select sample (**AAWSE 10078**) collected from the greenstone contained 1,336 ppm copper, 0.2 ppm silver, and 18 ppb gold.
Latitude N 61° 38' 35.239"; Longitude W 143° 45' 06.493"; Elevation 4,350 ft.

Estimated location:
Latitude N 61° 38' 42"; Longitude W 143° 45' 14"; Elevation 4,750 ft.

References:

Bibliography:

MONTANA BOY

MAS no: 0020860198 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Mountain Boy
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: At the 5,250 ft. elevation on the ridge between the Middle Fork and the East Fork Copper Creek, a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 008 E. *Section:* 30
Quadrangle: Valdez C-1 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1922 - Prospecting done (Moffit and Mertie, 1923).

Operating data:
Two opencuts and a 10 ft. long, south trending adit (Moffit and Mertie, 1923; Van Alstine and Black, 1946).

Geologic setting:
Nikolai Greenstone bedrock crossed by a N. 48° W. vertical zone of fractures with copper mineralization. Bornite, the major mineral, with chalcopyrite found near the limestone-greenstone contact. Reported free gold panned from this claim (Moffit and Mertie, 1923; Van Alstine and Black, 1946).

Recent investigations:

USGS/USBM/BLM work:
BLM
Located and sampled during 1998.
Lower opencut.
Bedrock consists of iron-oxide stained Chitistone Limestone which contains small veins of calcite. The opencut is 3 ft. wide, 15 ft. long, and 2 ft. deep. No visible copper mineralization was noted at the workings.
A grab sample (**AAWSE 10074**) taken of the iron-oxide stained limestone contained 44 ppm copper.
Latitude N 61° 39' 45.979"; Longitude W 144° 01' 56.875"; Elevation 5,230 ft.

Upper opencut.

Bedrock consists of iron-oxide stained Chitistone Limestone which contains small veins of calcite. The opencut is 3 ft. wide, 3 ft. deep, and 4 ft. long. No samples were collected. No visible copper mineralization noted at the workings.

Latitude N 61° 39' 46.620"; Longitude W 144° 01' 53.811"; Elevation 5,380 ft.

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MOUNTAIN SHEEP

MAS no: 0020860199 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Company name(s):
Mineral survey(s):

Commodity: Copper, silver
Deposit type: Basaltic Cu

Location: At the 4,650 ft. elevation on the west side of the Middle Fork Copper Creek, a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 007 E. *Section:* 25
Quadrangle: Valdez C-1 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:

1922 - Prospecting done (Moffit and Mertie, 1923).

Operating data:

One opencut and a 20 ft. long adit trending N. 65° W. (Moffit and Mertie, 1923; Van Alstine and Black, 1946).

Geologic setting:

The adit is driven into the Nikolai Greenstone below the Chitistone Limestone. The greenstone is locally shattered and contains disseminated pyrite, bornite, and minor chalcopyrite. Several zones up to 1 in. thick contain 1% bornite by volume. Limonite, malachite, and azurite stain the greenstones near the adit (Moffit and Mertie, 1923; Van Alstine and Black, 1946).

Recent investigations:

USGS/USBM/BLM work:

BLM

Located and sampled during 1998.

Adit driven onto the Nikolai Greenstone. The adit followed a 3-ft.-wide shear zone trending N. 55° W., dipping 60° E., for 20 ft. Sloughing has occurred at 10 ft. from the portal. Bornite, chalcopyrite, malachite, and azurite occur along the shear zone.

A select sample **(AAWSE 10106)** collected from ore along the floor of the adit contained 3% copper and 3.1 ppm silver.

Latitude N 61° 40' 02.683"; Longitude W 144° 03' 14.612"; Elevation 4,760 ft.

Adit location:

Latitude N 61° 40' 02.716"; Longitude W 144° 03' 14.675"; Elevation 4,760 ft.

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MULLEN MINE

MAS no: 0020860126 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Angle Lode
Copper Creek
Hoffman Prospect
Mullen Group
Mullen Lode
Sport Lode
Copper Mountain Millsite

Commodity: Copper, gold, silver
Deposit type: Basaltic Cu

Company name(s):
Alaska Copper Mining Co. Inc.
Alaska Hurlock Syndicate
Alaska Pioneer Copper Co.
Copper Creek Copper Mining Co.
Copper River Exploration
Coronada Copper and Zinc Co.
Galena Bay Mining Co.
Golden Bay Mining Co.

Mineral survey(s):
M.S. 904

Patent number(s):
806021

Location: The Mullen No. 1 Adit is located at the 3,755 ft. elevation on the west side of Copper Creek, a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 007 E. *Section:* 24
Quadrangle: Valdez C-1 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Past producer/Patented

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:

1900 - A 15 ft. long opencut with a shallow shaft at its end (Schrader and Spencer, 1901).
- A ton of material mined and two select samples contained 30% copper with one sample having over 2 oz. gold and one having 1/10 oz. silver (Schrader and Spencer, 1901).
- Hoffman Prospect staked (KX 86-141).

1907 - Fifteen claims staked by Scott Simenstad and E.W. Hundley (KX 86-064).

1911 - Mineral Survey 904 surveyed, October 11-12, for the Galena Bay Mining Co. Claims include the Angle, Mullen, and Sport Lodes.
- Mineral Survey 906 surveyed, October 22, for the Galena Bay Mining Co. Claim includes the Minneapolis Lode.

- Mineral Survey 907 surveyed, October 14-15, for the Galena Bay Mining Co. Claims include the Crag and Glance Lodes.
- Mineral Survey 908 surveyed, October 16-17, for the Galena Bay Mining Co. Claims include the Franklin Lode and the Franklin Nos. 2-3 Lodes.

1916 - Six claims staked by Robert Jenkins (KX 86-148).
1917 - Three opencuts: northern cut 20 ft. long, 10 ft. deep, middle cut, southern cut (Moffit and Maddren, 1908).
1921 - Patented May 12, 56.057 acres.
1926 - Development work done (Smith, 1927).
- Eight claims staked by A.K. Crawford and Adolph Ammann (KX 86-140).

1927 - Development work completed by several men hired by George H. Hurlock (Smith, 1930a).
1928 - Some work done (Smith, 1930b).
1929 - Inactive (Smith, 1930c).
1930 - Inactive (Smith, 1931).
1936 - Mining done (Smith, 1938).
1944 - Workings include an opencut, two adits with drifts, crosscuts, and inclined shafts.
- 800 ft. of underground workings, unknown length of the inclined shafts, and possible flooding. No. 2 Adit is caved (Van Alstine and Black, 1946).

1969 - Thirty-nine claims staked by John Hewitt and Scott Simenstad (KX 86-165).
1971 - Sixty-two claims staked by Joseph F. Taylor and Warren T. Taylor (KX 86-172).

Production:

One ton of material mined (Schrader and Spencer, 1901).

Operating data:

By 1911 the Angle, Mullen, and Sport Lodes Mineral Survey 904 reports 7 opencuts, 3 tunnels, and 1 shaft.

Workings include 4 opencuts, a shallow shaft, 2 adits with 800 ft. of workings which include drifts, crosscuts, and an inclined shaft.

As of 1944 the Lower Camp included; sawmill, engine house, stable, blacksmith shop, garage, bunkhouse, bath house, warehouse, office, mess hall, assay office, and 3 store houses.

Upper Camp includes 3 bunk houses, mess hall, and bath house.

Mullen No. 1 adit has a compressor house and a tool shop (Van Alstine and Black, 1946).

Van Alstine with the USGS published a map of the underground workings of the No. 1 Adit and the No. 2 Adit in 1946 (Van Alstine and Black, 1946).

Geologic setting:

Three poorly defined north-south mineralized zones, 1 to 3 ft. thick, made up of altered limestone. Ore minerals include chalcopyrite and bornite with malachite and iron-oxide staining (Schrader and Spencer, 1901).

In the underground workings the Chitistone Limestone is exposed through most of them with the Nikolai Greenstone exposed near the end of several crosscuts. Small bodies of diorite are located along the contacts as well as intruding into them. The diorite is a lighter colored, highly altered, medium-grained granitoid rock. Faults are abundant and conspicuous near the diorite bodies. A

½- to 4-in.-wide calcite and copper vein follows a N. 10° W. slickenside fault zone in the No. 1 Adit (Van Alstine and Black, 1946).

Recent investigations:

USGS/USBM/BLM work:

USGS

Two select samples contained 30% copper with one sample having over 2 oz. silver and the other having 1/10 oz. gold (Schrader and Spencer, 1901).

BLM

Located and sampled several adits and one opencut during 1997 and 1998.

Mullen No. 1 Adit

Adit open, driven N. 48° E. along a shear zone containing quartz and chalcopyrite. The first crosscut contains dynamite, also remnant of a winze visible at the right side of the portal. The map of the workings published by Van Alstine and Black (1946) shows a correct depiction of the underground workings. Two collapsed buildings are located outside the portal.

A select sample **(AAWSE 10040)** collected across the 3-ft.-wide quartz shear zone at the portal contained 12.2% copper, 23.6 ppm silver, and 286.1 ppm cadmium.

Latitude N 61° 40' 34.613"; Longitude W 144° 03' 53.492"; Elevation 3,700 ft.

Mullen No. 2 Adit

Adit caved at the portal. This adit appears to have been the haulage tunnel as there are rails connecting this adit with the No. 1 Adit. Driven 100 to 150 ft. below the opencut, most likely driven to undercut this mineralized zone.

No samples were collected. No copper mineralization noted in the waste dump.

Latitude N 61° 40' 32.601"; Longitude W 144° 03' 52.244"; Elevation 3,580 ft.

Mullen No. 3 Adit

Adit open, driven N. 8° E. for 10 ft. just below and north of the No. 1 Adit. Most likely driven to undercut the shear zone in the No. 1 Adit. Thirty feet above this adit is a wooden platform, possibly to assist in starting another adit. Malachite stained rocks were noted above this location.

No samples were collected. No copper mineralization noted in the adit or on the waste dump.

Latitude N 61° 40' 35.035"; Longitude W 144° 03' 53.335"; Elevation 3,670 ft.

Mullen No. 4 Adit

Adit open, driven N. 8° E. for 27 ft. where it intersects a 12-in.-wide shear zone containing ½-in.-wide quartz veins. No visible copper mineralization was noted in the shear. This adit had the remains of a wooden door frame and the door lying close by. Was this adit used as a root cellar?

No samples were collected. No copper mineralization noted in the adit or on the waste dump.

Latitude N 61° 40' 35.547"; Longitude W 144° 03' 53.421"; Elevation 3,690 ft.

Mullen Opencut

Opencut driven westward into the face of the limestone outcrop 100 to 150 ft.

above Mullen No. 2 Adit. The opencut is 15 ft. wide, 20 ft. tall, and 20 ft. deep. Malachite, azurite, and massive chalcopyrite occur in an iron-stained shear zone.

A random chip sample (**AAWSE 10039**) collected across the 4-ft.-wide face contained 34.46% copper, 40.5 ppm silver, and 38 ppb gold. A select sample (**AAWSE 10039-A**) collected of high grade contained 36.64% copper, 109.7 ppm silver, and 45 ppb gold.

Latitude N 61° 40' 30"; Longitude W 144° 03' 57"; Elevation 3,850 ft.

Resources:

USGS

1946 (Van Alstine and Black, 1946)

Vein no. 1 - Contains 1,263 tons of indicated ore with 1.55% copper.

Vein no. 2 - Contains 59 tons of indicated ore with 5.82% copper, trace gold, and 0.28 oz. per ton silver.

References:

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NEWHOME

MAS no: 0020870152 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Fall Creek
Kluvesna Creek
Trail Creek
Company name(s):
Adolph Ammann
Mineral survey(s):

Commodity: Copper, gold, silver
Deposit type: Basaltic Cu

Location: At the 4,440 ft. elevation on the south side of Trail Creek, a western tributary of Fall Creek, a northwestern tributary of the Kotsina River.

Township: 001 S. *Range:* 008 E. *Section:* 10
Quadrangle: McCarthy D-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1907 - Staked by Adolph Ammann and Jack Nafsted (KX 87-32).
- Prospecting and development work done (Moffit and Maddren, 1908; Moffit and Maddren, 1909).

Operating data:
One short tunnel and several opencuts (Moffit and Mertie, 1923).

Geologic setting:
Bedrock consists of Nikolai Greenstone fractured and veined with quartz containing bornite and chalcopyrite (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Located and sampled during 1997.
Area reexamined and three opencuts sampled in 1998.
Newhome Adit
Adit open, driven N. 70° E. for 35 ft. in Nikolai Greenstone. At 28 ft. from the portal the adit cut across a 6-in.-wide shear zone with quartz veins ⅛ in. thick. Minor quartz veins at the face but no visible mineralization noted. Bornite,

malachite, and azurite associated with the quartz veins.

A select sample (**AAWSE 10037**) collected from the waste dump contained 5,354 ppm copper, 7.4 ppm silver, and 8 ppb gold.

Latitude N 61° 47' 29.965"; Longitude W 143° 55' 50.555"; Elevation 4,440 ft.

Adit location:

Latitude N 61° 47' 28.403"; Longitude W 143° 55' 58.126"; Elevation 4,430 ft.

Opencut No. 1

Bedrock consists of iron-oxide stained Nikolai Greenstone. The opencut, 15 ft. wide, 20 ft. deep, and 15 ft. at the face, is cut along a mineralized shear zone with associated quartz and epidote veining. Bornite, chalcocite, and malachite occur along the shear zone. The bornite surrounds the chalcocite.

A select sample (**AAWSE 10100**) collected from the waste dump contained 2.49% copper, 11.6 ppm silver, and 6 ppb gold.

Latitude N 61° 47' 25.172"; Longitude W 143° 55' 59.268"; Elevation 4,490 ft.

Opencut location:

Latitude N 61° 47' 25.124"; Longitude W 143° 55' 59.268"; Elevation 4,490 ft.

Opencut No. 2

Bedrock consists of iron-oxide stained Nikolai Greenstone.

No samples were collected. No visible copper mineralization noted.

Latitude N 61° 47' 27.785"; Longitude W 143° 56' 01.676"; Elevation 4,540 ft.

Opencut No. 3

Bedrock consists of iron-oxide stained Nikolai Greenstone containing a mineralized shear zone with associated quartz veining. The shear zone, located directly above the adit, appears to be a continuation of the same shear zone the adit was driven into. Bornite, chalcocite, and malachite occur along the shear zone. The bornite surrounds the chalcocite.

A select sample (**AAWSE 10101**) collected from waste dump located on the north side of the opencut contained 2.61% copper, 5.6 ppm silver, and 20 ppb gold.

Latitude N 61° 47' 28.183"; Longitude W 143° 56' 01.129"; Elevation 4,520 ft.

Opencut location:

Latitude N 61° 47' 28.186"; Longitude W 143° 56' 01.093"; Elevation 4,520 ft.

References:

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NUGGET CREEK MINE

MAS no: 0020870065 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Lucky Boy Tunnel
Nugget Gulch

Company name(s):
Alaska Consolidated Copper Co.
Alaska Copper Corp.

Mineral survey(s):
M.S. 891
M.S. 892
M.S. 893, Sections A, B, C, D

Commodity: Copper, gold, silver
Deposit type: Basaltic Cu

Patent number(s):
487252 through 487253

Location: Located between the 3,500 and 3,700 ft. elevation on the east side of Nugget Greek, a northern tributary of the Kuskulana River, northwest of the Kuskulana Glacier toe.

Township: 003 S. *Range:* 009 E. *Section:* 02
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Past producer/Patented

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:

1900 - Thirty-six claims staked by James McCarthy, O.H. Thorgaard, and Jerry and Joan Coppes (KX87-045).

1902 - Jennie, Gray Hound, One Girl, Newport, Illinois, Wisconsin, Excelsior, Excelsior No. 2, York, York No. 2, York No. 3, Lucky Girl, Lucky Girl No. 2, Lucky Boy, Valdez, Comstock, Owl, Seattle, Queen Ann, Ballard, Redding, Salem, Black Hawk, Wilkes Barre, Tom Thumb, Tom Thumb No. 2, Copper Queen, Copper Queen No. 2, Copper Queen No.3, and Copper Queen No. 4 Lodes located June 9, 1902 to August 23, 1907, by the Alaska Consolidated Copper Co.
- Claims recorded July 25, 1902 to September 4, 1907.

1905 - Buffalo, Blue Bell, Pennsylvania, and White Horse Lodes located June 15-22.

1907 - The Valdez claim tunnel and "Mud Tunnel" were driven (Moffit and Maddren, 1908).
- German Town Lode located, July 15, by Alaska Consolidated Copper Co.
- Claim recorded September 4.

1908 - Two new tunnels were driven (Moffit, 1909).

1909 - Mineral Survey 893 surveyed, July 10-31, for the Alaska Consolidated Copper Co. Claims include those listed as located in 1902.
- Mineral Survey 892 surveyed, July 31 - August 4, for the Alaska Consolidated Copper Co.

- Mineral Survey 891 surveyed, August 4-6, for the Alaska Consolidated Copper Co. Claim includes the German Town Lode.
- Development work continued (Moffit, 1910).

1912 - Development work continued. Ore stockpiled in dumps and sacks from the Valdez claim (Moffit, 1913).
1913 - Development work continued (Brooks, 1914).
1914 - Development work continued (Brooks, 1915).
1914 - Development work continued by the Alaska Copper Corp. (Brooks, 1916).
1915 - Development work continued (Smith, 1917b).
- Patented August 19.

1916 - Development work continued. Ore reported shipped (Moffit, 1918).
1917 - A road to Strelna was started (Brooks, 1921).
1918 - Development work continued. Ore reported shipped (Martin, 1919).
1919 - Mining operation ceased, all equipment moved out (Brooks, 1921).
1943 - All workings caved (Van Alstine and Black, 1946).

Production:

Total production between 1916 and 1918 was 160 tons of concentrates and hand-sorted ore. Prior to 1916, two car loads of high-grade hand sorted ore shipped (Moffit, 1921, Moffit and Mertie, 1923).

Operating data:

1907 - Mineral Survey 893 reported 4 shafts, 9 tunnels, and 35 opencuts.
1909 - Mineral Survey 891 reported one tunnel.

Valdez claim

Valdez Tunnel

A 30 ft. tunnel, numerous opencuts, and a 30 ft. deep shaft (Moffit and Maddren, 1908). By 1912 the shaft was 163 ft. deep and 900 ft. of tunneling driven (Moffit, 1913). By 1914 the shaft was 170 ft. deep and 1,500 ft. of tunneling driven (Moffit, 1915).

The northwest tunnel (Moffit, 1909).

The southwest tunnel - driven 100 ft. (Moffit, 1909).

Lucky Boy Tunnel

By 1916 the main level (160 ft. level) includes drifts at the 35, 50, and 105 ft. levels. A 60 ft. crosscut in the shaft driven (Moffit, 1918).

One Girl claim

The "Mud Tunnel" has been driven 100 ft. S. 75° W. and several opencuts (Moffit and Maddren, 1908).

1916 - Power plant and compressor installed (Smith, 1917b).
1918 - A concentration plant with jaw crushers, jigs, along with "Wilfley" and Card tables installed (Martin, 1919).

Geologic setting:

Bedrock consists of amygdaloidal Nikolai Greenstone and Chitistone Limestone (Moffit and Maddren, 1908).

Valdez claim

Nikolai Greenstone cut by a fault and a set of perpendicular faults trending N. 65° E. where the ore is deposited. The fault set can be traced for several hundred feet. A 2-ft.-wide calcite vein contains bornite and minor chalcopyrite. A 2- to 3-in.-wide fault containing blue and yellow clay also contains small crystals of chalcopyrite (Moffit and Maddren, 1908).

One Girl claim

Driven into amygdaloidal Nikolai Greenstone. No ore encountered in the workings (Moffit and Maddren, 1908).

A 2 to 3 ton native copper nugget, 7 ft. long, 2 ft. 3 in. wide, by 12 in. thick, was discovered in the creek bed. This is how the name Nugget Creek was derived (Moffit and Maddren, 1908).

Recent investigations:

USGS/USBM/BLM work:

USBM

Site visit in 1977 (USBM field notes).

BLM

Located the lower adit during 1997.

Located and sampled the upper adit during 1998.

Lower Adit

Adit caved. Millsite location.

No samples were collected.

Latitude N 61° 38' 34.011"; Longitude W 143° 43' 05.271"; Elevation 3,500 ft.

Upper Adit

Adit open, partially sloughed at portal. Driven N. 32° W. for 20 ft. Iron-oxide stained shear zone in front of portal which has been trenched. Bornite, malachite, and azurite occur in the shear zone.

A select sample (**AAWSE 10079**) collected of high grade material from the waste dump contained 10.65% copper, 61.5 ppm silver, and 16 ppb gold.

Latitude N 61° 38' 34.651"; Longitude W 143° 43' 05.293"; Elevation 3,660 ft.

Adit location:

Latitude N 61° 38' 35.481"; Longitude W 143° 43' 04.668"; Elevation 3,670 ft.

References:

Bibliography:

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PORCUPINE CREEK HEAD

MAS no: 0020870041 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Company name(s):
Mineral survey(s):

Commodity: Copper, gold
Deposit type: Basaltic Cu

Location: At approximately the 3,940 ft. elevation at the headwaters along the west side of Porcupine Creek, a northern tributary of the Kuskulana River.

Township: 003 S. *Range:* 009 E. *Section:* 05
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1916 - Four claims staked by A.L. Barrett, Ed Young, and Jake Nafsted (KX 87-037).
1923 - Two tunnels driven, one just recently started (Moffit and Mertie, 1923).

Operating data:
Two short tunnels (Moffit and Mertie, 1923).

Geologic setting:
bedrock consists of Nikolai Greenstone sheared with minute veinlets of malachite and minor chalcopyrite (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for but not located during 1997 and 1998.
Estimated location:
Latitude N 61° 38' 02"; Longitude W 143° 48' 57"; Elevation 3,940 ft.

References:

Bibliography:
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ROARING CREEK

MAS no: 0020870061 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Astor Lode
Austin Lode
Camp 3
Emma Lode
Frisco Lode
Ideal Lode
Laurence Lode
Minnie Lode
Native Copper Lode
Prescott Lode
Reco Lode
Red Jacket Lode
Sunset Lode
Toledo Lode

Commodity: Copper
Deposit type: Basaltic Cu

Company name(s):
California-Alaska Mining and Development Co.

Mineral survey(s):
M.S. 952

Location: Between the 5,250 and 5,450 ft. elevation on the west side of Roaring Creek, a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 009 E. *Section:* 18
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1907 - Claims staked by Adolph Ammann and Jack Nafsted (KX 87-032).
1914 - Prospecting and development work completed (Moffit, 1915).

Operating data:
Above Camp 3 the Lower tunnel was driven 50 ft. by the California-Alaska Mining and Development Co. (Moffit and Maddren, 1908; Moffit and Maddren, 1909; Moffit and Mertie, 1923).

Geologic setting:

Nikolai Greenstone interbedded with slaty beds and hard, fine-grained, cherty-looking beds intermingled with amygdaloidal flows. Workings driven into a gray and black mottled slate (Skolai Group) near a fault plane striking N. 20° W. Pyrite, chalcopyrite, bornite, native copper, and azurite occur in the calcite-quartz veins (Moffit and Maddren, 1908; Moffit and Maddren, 1909).

A 500 to 600 pound native copper nugget was found in slide rock in the gulch north of the Camp 3 tunnel (Moffit and Maddren, 1908; Moffit and Maddren, 1909).

Recent investigations:

USGS/USBM/BLM work:

USBM

Site visit during 1977 (USBM field notes).

BLM

Located and sampled during 1998.

Camp 3 Tunnel - Adit No. 1

Adit caved, appeared to be driven S. 24° W. for an unknown length. Bedrock consists of highly iron-oxide stained and fractured Nikolai Greenstone. Native copper, chalcocite, bornite, malachite, and azurite occurs in associated quartz and calcite veins.

A select sample (**AAWSE 10089**) collected of high grade mineralization from float to the right of the adit contained 23.02% copper, 3.6 ppm silver, and 43 ppb gold.

Latitude N 61° 41' 18.113"; Longitude W 143° 50' 31.087"; Elevation 5,290 ft.

Adit location:

Latitude N 61° 41' 17.805"; Longitude W 143° 50' 31.185"; Elevation 5,290 ft.

Upper opencut

Bedrock consists of highly iron-oxide stained and fractured Nikolai Greenstone. Native copper, chalcocite, bornite, malachite, and azurite occurs in associated quartz and calcite veins.

A select sample (**AAWSE 10090**) collected of high grade mineralization from the trench contained 14.48% copper, 23.4 ppm silver, and 23 ppb gold.

Latitude N 61° 41' 17.893"; Longitude W 143° 50' 33.355"; Elevation 5,450 ft.

References:

Bibliography:

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U.S. Bureau of Mines, 1978, Mineral appraisal of the Wrangell-St. Elias region: A summary report: U.S. Bureau of Mines Open-File Report 64-78, p. 33, no. 93.

ROARING CREEK SOUTHEAST

MAS no: 0020870153 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: At approximately the 4,750 ft. elevation on the east side near the head of Roaring Creek, a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 009 E. *Section:* 20
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1907 - Claims staked by Adolph Ammann and Jack Nafsted (KX 87-032).
1914 - Prospecting and development work completed (Moffit, 1915).

Operating data:
One tunnel (Moffit and Maddren, 1908; Moffit and Maddren, 1909).

Geologic setting:
Bedrock consists of Nikolai Greenstone with native copper (Moffit and Maddren, 1908; Moffit and Maddren, 1909). Claim abandoned. Pyrite, chalcopyrite, and bornite occur in small quantities (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Located from the air but not sampled during 1998.
Caved adit located to the east of the toe of the glacier about 40 ft. above the lateral moraine. Due to time constraints we were not able to locate and sample this location on the ground.
Estimated location:
Latitude N 61° 40' 32"; Longitude W 143° 49' 19"; Elevation 4,750 ft.

References:

Bibliography:

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ROARING CREEK SOUTHWEST

MAS no: 0020870154 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Company name(s):
Great Northern Development Co.
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: At the 4,600 ft. elevation on the west side of Roaring Creek just south of the western tributary. Roaring Creek is a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 009 E. *Section:* 20
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1907 - Claims staked by Adolph Ammann and Jack Nafsted (KX 87-032).
1914 - Prospecting and development work completed (Moffit, 1915).

Operating data:
One tunnel (Moffit and Maddren, 1908; Moffit and Maddren, 1909).

Geologic setting:
Bedrock consists of gray and black mottled shales, of the Skolai Group, near a fault plane separating the shales from the Nikolai Greenstone. The slate cleavage strikes N. 20° W. with a near vertical dip. The adit is driven perpendicular to the cleavage strike. The rocks are iron-oxide stained, but contain no copper minerals (Moffit and Maddren, 1908; Moffit and Maddren, 1909).

Recent investigations:

USGS/USBM/BLM work:
BLM
Located from the air but not sampled during 1998.
Caved adit driven into a Nikolai Greenstone cliff south of the western tributary. Due to time constraints we were not able to locate and sample this location on the ground.
Estimated location:
Latitude N 61° 40' 55"; Longitude W 143° 49' 57"; Elevation 4,600 ft.

References:

Bibliography:

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Moffit, F.H., and Maddren, A.G., 1908, The mineral resources of the Kotsina and Chitina valleys, Copper River region, *in* Brooks, A.H., and others, Mineral resources of Alaska, report on progress of investigations in 1907: U.S. Geological Survey Bulletin 345, p. 139.

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SKYSCRAPER

MAS no: 0020870060 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Castle
Morning Star
Skyscraper Group
Skyscraper 1-11
Snowshoe
Snowshoe Extension
West Skyscraper
Company name(s):
Kotsina Mining Co.
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: Between the 5,000 and 5,100 ft. elevation on the west side of Skyscraper Peak, on the east side of Roaring Creek, a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 009 E. *Section:* 17
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1907 - Six claims staked by Adolph Ammann and Jack Nafsted (KX 87-032).
- Prospecting and development work completed (Moffit and Maddren, 1908).
1914 - Assessment and development work completed (Moffit, 1915).
1923 - Claims lapsed.
1971 - Fifty-five claims staked in the area by Joseph Taylor (KX 87-156).

Operating data:
Several opencuts and short tunnels (Moffit and Maddren, 1908), one being 100 ft. long (Moffit, 1915) located on the Snowshoe claim (Moffit and Mertie, 1923). A short adit located on the West Skyscraper claim (Moffit and Mertie, 1923).

Geologic setting:
Lenticular mass of chalcocite 6 in. thick and 3 ft. long cutting the rough, coarse-grained Nikolai Greenstone that underlies the Chitistone Limestone. The chalcocite also occurs as patches and lenses within the greenstone (Moffit and Maddren, 1908). Subordinate native copper (probable alteration of chalcocite) has been noted as rough, branching bodies on the Snowshoe Extension, Skyscraper, and Castle claims (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:

USBM

Site visit during 1977.

Located and sampled the southern N. 85° E. trending, 30 ft. long adit, analysis results unavailable (USBM field notes).

BLM

Located two adits and one opencut from the air but unable to sample in 1998.

Adit No. 1

Estimated location:

Latitude N 61° 41' 55"; Longitude W 143° 48' 17"; Elevation 5,000 ft.

No samples collected.

Adit No. 2

Estimated location:

Latitude N 61° 42' 06"; Longitude W 143° 48' 08"; Elevation 5,100 ft.

No samples collected.

Opencut

Estimated location:

Latitude N 61° 42' 17"; Longitude W 143°48' 05"; Elevation 5,100 ft.

No samples collected.

Camp

Estimated location:

Latitude N 61° 42' 12"; Longitude W 143° 48' 25"; Elevation 4,200 ft.

Resources:

USBM

A rough estimate of 2,000,000 tons ore with 2% copper was made in 1977 (USBM field notes).

References:

Bibliography:

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ALASKA KARDEX 87-156

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SKYSCRAPER PEAK WEST

MAS no: 0020870155 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Arctic Chief Lode
Copper King Lode
Gem Lode
Hercules Lode
Mineral King Lode

Commodity: Copper
Deposit type: Basaltic Cu

Company name(s):
California-Alaska Mining and Development Co.

Mineral survey(s):
M.S. 953

Location: At the 4,700 ft. elevation on the north side of the western tributary of Roaring Creek, a southern tributary of the Kotsina River.

Township: 002 S. *Range:* 009 E. *Section:* 17
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1907 - Claims staked by the California-Alaska Mining and Development Co. (M.S. 953).
1911 - Mineral Survey 953 surveyed July 28-31 by Frederick Butterworth (M.S. 953).
1971 - Fifty-five claims staked in the area (KX 86-156).

Operating data:
1911 - Five reported tunnels (M.S. 953).

Geologic setting:
Bedrock consists of Nikolai Greenstone with thin ⅛-in.-wide quartz veins and epidote overlain by Chistochina Limestone. Chalcocite, bornite, chalcopyrite, and native copper occur in the area (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Located and sampled during 1998.
Adit open, driven N. 4° E. for 40 ft. At 20 ft. from the portal the adit is sloughed.

Bedrock consists of Nikolai Greenstone and brecciated, amygdaloidal basalts with thin ⅛-in.-wide quartz and epidote veins. A shear zone, up to 6 in. wide, cuts perpendicular to the adit at the portal. No visible copper mineralization was noted at this location.

A grab sample (**AAWSE 10091**) collected of material that fell from the roof of the adit at 20 ft. contained 196 ppm copper.

Latitude N 61° 41' 25.393"; Longitude W 143° 48' 06.158"; Elevation 4,790 ft.

Adit location:

Latitude N 61° 41' 26.417"; Longitude W 143° 48' 06.340"; Elevation 4,790 ft.

References:

Bibliography:

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SQUAW CREEK

MAS no: 0020870158 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Company name(s):
Mineral survey(s):

Commodity: Copper
Deposit type: Stringer BCO

Location: At approximately the 3,400 ft. elevation on the west side of the mouth of Squaw Creek, a northern tributary of the Kuskulana River.

Township: 003 S. *Range:* 008 E. *Section:* 35
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
Unknown.

Operating data:
None reported.

Geologic setting:
Bedrock consists of Nikolai Greenstone capped with Chitistone Limestone.

Recent investigations:

USGS/USBM/BLM work:
BLM
Located from the air but unable to sample during 1998.
Located what appears to be an open adit hidden behind alder bushes at the base of a cliff. The cliff is located on the lower part of the mountain. This adit is extremely difficult to get to. Would most likely need ropes to reach the workings.
No samples collected.
Estimated location:
Latitude N 61° 33' 56"; Longitude W 143° 53' 49"; Elevation 3,400 ft.

References:

Bibliography:

SUNRISE

MAS no: 0020870156 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Fall Creek
Kluvesna Creek
Trail Creek
Company name(s):
Adolph Ammann
Mineral survey(s):

Commodity: Copper, gold, silver
Deposit type: Basaltic Cu

Location: At the 4,310 ft. elevation on the north side of Trail Creek, a western tributary of Fall Creek, a northwestern tributary of the Kotsina River.

Township: 001 S. *Range:* 008 E. *Section:* 10
Quadrangle: McCarthy D-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1907 - Staked by Adolph Ammann and Jack Nafsted (KX 87-32).
- Prospecting and development work done (Moffit and Maddren, 1908; Moffit and Maddren, 1909).

Operating data:
One short tunnel (Moffit and Maddren, 1908; Moffit and Maddren, 1909; Moffit and Mertie, 1923).

Geologic setting:
Vertical north-south fault in amygdaloidal Nikolai Greenstone cut by small light-colored, fine-grained, porphyritic dikes containing quartz veins along with associated bornite. Native copper is present in outcrop (Moffit and Maddren, 1909; Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for but not located during 1997.
Looked for and possibly located. Samples collected in the area in 1998.
Opencut No. 1
Located directly below the Homestake adit, at the creek level, appears to be a

possible opencut.

No samples were collected. No visible copper mineralization was noted at this location.

Estimated location:
Latitude N 61° 47' 34.610"; Longitude W 143° 56' 10.733"; Elevation 4,270 ft.

Opencut No. 2

Further down stream on the north side of the creek, an outcrop of malachite stained Nikolai Greenstone is located 40 ft. above the creek level. Area appears to be an opencut. Disseminated bornite, chalcocite, and malachite occurs in the quartz.

A select sample **(AAWSE 10086)** collected across a 4-ft.-wide section of the outcrop contained 2.77% copper, 8.9 ppm silver, and 10 ppb gold.
Latitude N 61° 47' 34.191"; Longitude W 143° 55' 57.940"; Elevation 4,090 ft.

References:

Bibliography:

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Meyer, M.P., and Shepherd, A.D., 1998, Mineral assessment of Ahtna, Inc. selections in the Wrangell-St. Elias National Park and Preserve, Alaska. 1997 preliminary report: U.S. Bureau of Land Management Open File Report 71, p. 88-90.

SUNSET

MAS no: 0020870157 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Fall Creek
Kluvesna Creek
Film Flam Gulch
Flimflam Gulch
Company name(s):
Adolph Ammann
Mineral survey(s):

Commodity: Copper, gold, silver
Deposit type: Basaltic Cu

Location: At the 4,050 ft. elevation on the south and north side of Flim Flam Gulch, a western tributary of Fall Creek, a northwestern tributary of the Kotsina River.

Township: 001 S. *Range:* 008 E. *Section:* 10
Quadrangle: McCarthy D-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:
1907 - Staked by Adolph Ammann and Jack Nafsted (KX 87-32).
- Prospecting and development work done (Moffit and Maddren, 1908; Moffit and Maddren, 1909).

Operating data:
One short tunnel (Moffit and Maddren, 1908; Moffit and Maddren, 1909; Moffit and Mertie, 1923).

Geologic setting:
Small fractured veins of quartz and calcite along a north-south fault within crushed amygdaloidal Nikolai Greenstone. Malachite stains the surface exposures of the greenstone with azurite and malachite present in the fractures. Cuprite is also present as well as a black, carbonaceous, copper-bearing material between the blocks of greenstone (Moffit and Maddren, 1908; Moffit and Maddren, 1909; Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:
BLM
Looked for but not located during 1997.

Located and sampled one adit and an opencut in 1998.

Adit

Adit caved, though with some minor digging could be reopened. The adit is located on the south side of the creek at creek level. It appears to have been driven S. 38° W. for an unknown length. Bedrock consists of sheared Nikolai Greenstone with quartz and calcite veining. Native copper, bornite, and malachite occur in the shear zone. The black carbonaceous material noted by Moffit and Mertie was found with the copper mineralization.

A select sample (**AAWSE 10098**) collected across the 2-ft.-wide shear zone above the adit contained 9.56% copper, 32.4 ppm silver, and 6 ppb gold.

Latitude N 61° 47' 39.471"; Longitude W 143° 55' 40.449"; Elevation 4,140 ft.

Adit location:

Latitude N 61° 47' 39.490"; Longitude W 143° 55' 40.296"; Elevation 4,140 ft.

Opencut

The opencut is located on the north side of the creek, at creek level, just up stream from the adit. Bedrock consists of sheared Nikolai Greenstone. The 2-ft.-wide shear zone has a strike of S. 40° E., with a vertical dip. The opencut, driven along the shear zone, is 15 ft. long, 7 ft. wide, and 5 ft. deep, and is filled with water. Disseminated chalcopyrite, pyrite, and malachite occurs along the shear zone.

A grab sample (**AAWSE 10099**) collected from the shear zone contained 5,732 ppm copper and 3.2 ppm silver.

Latitude N 61° 47' 41.203"; Longitude W 143° 55' 41.887"; Elevation 4,160 ft.

Opencut location:

Latitude N 61° 47' 41.216"; Longitude W 143° 55' 40.951"; Elevation 4,170 ft.

References:

Bibliography:

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SURPRISE/SUNSHINE

MAS no: 0020870051 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Surprise Creek Group
Company name(s):
Alaska-Kotsina Copper Co.
Mineral survey(s):

Commodity: Copper
Deposit type: Basaltic Cu

Location: Above the 5,500 ft. elevation at the head of a gulch on the north side of the valley between Surprise and Sunshine Creeks. Surprise Creek is a northern tributary of the Kotsina River.

Township: 001 S. *Range:* 009 E. *Section:* 29
Quadrangle: McCarthy D-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect

Ahtna, Inc. selection: Not located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:

1900 - Five claims staked by the Alaska-Kotsina Copper Co. The Laddie, Sheehan, Hubbard, Drake, and Grenig claims (KX 87-043).

1907 - Development work carried out by the Alaska-Kotsina Copper Co. Tunnel started on the Hubbard claim. Several opencuts made during the previous years (Moffit, 1910).

1915 - Three claims renamed; the Laddie to True Blue, the Sheehan to George M., and the Hubbard to Joe Dandy (Moffit and Mertie, 1923).

Operating data:

Several opencuts and a tunnel (Moffit, 1915).

Principle Tunnel

A 135 ft. long tunnel driven on the Joe Dandy claim in an unknown direction. Workings ended before reaching the copper-bearing fractures (Moffit and Mertie, 1923).

Opencuts

Two opencuts exposed the vein on the Joe Dandy claim. The first exposed a 4- to 8-ft.-wide white quartz vein carrying chalcocite, bornite, and pyrite. The second cut (200 ft. northeast of the first) is along the strike of the fault, and is 40 ft. long and 25 ft. deep. The quartz vein is the same as exposed in the lower cut, however it is represented by many smaller lenticular veins with a maximum thickness of 12 in. (Moffit and Mertie, 1923).

Geologic setting:

Surprise Creek roughly follows the contact between the Nikolai Greenstone and a Tertiary intrusive diorite mass. The claims are located along a well defined fault zone within the greenstone

which trends generally northeast, dipping northwest, and traceable for over a mile. The fault zone, ranging in thickness from 2 to 8 ft., contains several zones of displacement or minor faults. The minor faults contain fissures and joints filled with the copper-bearing minerals and quartz. The quartz appears in veins and lenses ranging from 12 in. to 8 ft. thick. Chalcocite, bornite, and minor pyrite are found as lenses and irregular shaped masses. Quartz and copper were deposited before the movement on the fault stopped, as indicated by crushed vein material and slickensides on both sides of the veins (Moffit, 1915).

Tin has been reported in the diorite mass (Moffit and Mertie, 1923). Samples collected in 1902 contained no tin mineralization (Mendenhall, 1905).

Recent investigations:

USGS/USBM/BLM work:

BLM

Located and sampled one adit and two opencuts during 1998.

Adit

Adit open, driven N. 42° E. for approximately 135 ft. in the Nikolai Greenstone with 4-in.-wide quartz veins. At 50 ft. from the portal the adit crosses a 1-ft.-wide shear zone, and is partially sloughed in at this point. At 75 ft. from the portal an ore car is located with four cases and six sticks of dynamite located just beyond the ore car. No copper mineralization was noted in the adit or on the waste dump.

No samples were collected. No visible copper mineralization noted in the adit or in the waste dump..

Latitude N 61° 45' 06.224"; Longitude W 143° 48' 23.982"; Elevation 5,550 ft.

Opencut No. 1

Opencut No. 1 is located directly above the adit. Driven into the Nikolai Greenstone cutting a dark red, 2-ft.-thick quartz vein. The opencut is 4 ft. wide, 20 ft. long, and 20 ft. deep, driven N. 50° W. The quartz vein strikes N. 60° W., dipping steeply southwest, and is malachite and azurite stained. Bornite, chalcocite, chalcopyrite, malachite, and azurite occur as pods and disseminated throughout the quartz.

A select sample (**AAWSE 10093**) collected across the quartz vein contained 1.32% copper, 0.7 ppm silver, and 227 ppb gold.

A grab sample (**AAWSE 10093A**) collected of the high-grade material contained 20.49% copper, 6.6 ppm silver, and 2,938 ppb gold.

Latitude N 61° 45' 07.382"; Longitude W 143° 48' 24.057"; Elevation 5,640 ft.

Opencut No. 2

Opencut No. 2 is located to the west of Opencut No. 1, approximately 200 yards. Driven in the Nikolai Greenstone cutting a white 4 to 5 ft. wide, iron-oxide stained, quartz vein striking N. 70° E. with a vertical dip. The opencut is 12 ft. wide, 15 ft. deep, and 10 ft. high at the face. Bornite, chalcocite, malachite, and azurite occurred in the quartz vein. This western quartz vein is more iron-oxide stained than the eastern quartz vein.

A select sample (**AAWSE 10094**) collected of quartz from the waste dump contained 6,797 ppm copper, 2.1 ppm silver, and 66 ppb gold.

Latitude N 61° 45' 06.646"; Longitude W 143° 48' 26.493"; Elevation 5,630 ft.
Opencut location:
Latitude N 61° 45' 06.662"; Longitude W 143° 48' 26.486"; Elevation 5,630 ft.

References:

Bibliography:

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WARNER

MAS no: 0020870055 *Plate no.* 2

Ownership and Location:

Alternate name(s):
Galena-Nikolai Holding
McClellan Lode
Warner Lode
Warner Prospect

Company name(s):
Chittyna Exploration Co.
Nikolai Mining Co.

Owner:
Daryl Reindle
P.O. Box 101048
Anchorage, AK 99510

Commodity: Copper
Deposit type: Basaltic Cu

Mineral survey(s):
M.S. 547

Mineral certificate(s):
00000005

Location: At the 2,320 ft. elevation on the west side of the lower part of Rock Creek, a southern tributary of the Kotsina River. The location of the Mineral Survey on the Master Title Plat is located in the wrong section and should not be section 16.

Township: 002 S. *Range:* 008 E. *Section:* 09
Quadrangle: McCarthy C-8 *Meridian:* Copper River
Mining district: Chistochina *Mineral status:* Development prospect/Patented

Ahtna, Inc. selection: Located within Ahtna, Inc. selected lands.

Development and Geology:

History and production:

1899 - Warner and McClellan Lodes claims located, July 9, by the Chittyna Exploration Co.
- Claims recorded September 4.

1901 - Mineral Survey 547 surveyed, August 14-18, for the Chittyna Exploration Co. Claims include the Warner and McClellan Lodes.

1904 - Two claims staked by John H. Huber (KX 87-031).

1907 - Patented (Moffit and Maddren, 1908).

1922 - Development work done (Moffit and Mertie, 1923).

Operating data:

In 1901 Mineral Survey 547 reported a discovery shaft, 4 x 6 ft., 12 ft. deep; an opencut, 20 x 50 ft., 60 ft. deep; a tunnel, 4 x 7 ft., 22 ft. long; a crosscut, 12 x 15 ft., 15 ft. deep; and another crosscut, 5 x 20 ft.

Stripping of a 25 x 40 ft. area (Mendenhall and Schrader, 1903).

A 25 ft. tunnel driven S. 35° W. (Moffit and Mertie, 1923).

Geologic setting:

Bedrock consists of the Nikolai Greenstone in contact with the overlying Chitistone Limestone. A 3 to 3½ ft. wide crushed calcite fault zone trends S. 35° W. is stained with malachite and contains small irregular bodies of bornite and chalcopyrite scattered along the fault. The 25 ft. long adit was driven along the fault zone (Moffit and Mertie, 1923).

Recent investigations:

USGS/USBM/BLM work:

BLM

Located and sampled during 1998.

Adit open, driven S. 72° E. for 30 ft. Driven into iron-oxide stained Nikolai Greenstone along a 2-ft.-wide shear zone. Portal cribbed for first 10 ft. Located 20 ft. above the creek. Disseminated bornite occurs within the quartz and calcite veins.

A select sample (**AAWSE 10070**) collected from the shear zone contained 3.46% copper, 3.8 ppm silver, and 16 ppb gold.

Latitude N 61° 42' 31.701"; Longitude W 143° 57' 40.356"; Elevation 2,320 ft.

Adit location:

Latitude N 61° 42' 31.731"; Longitude W 143° 57' 40.373"; Elevation 2,320 ft.

References:

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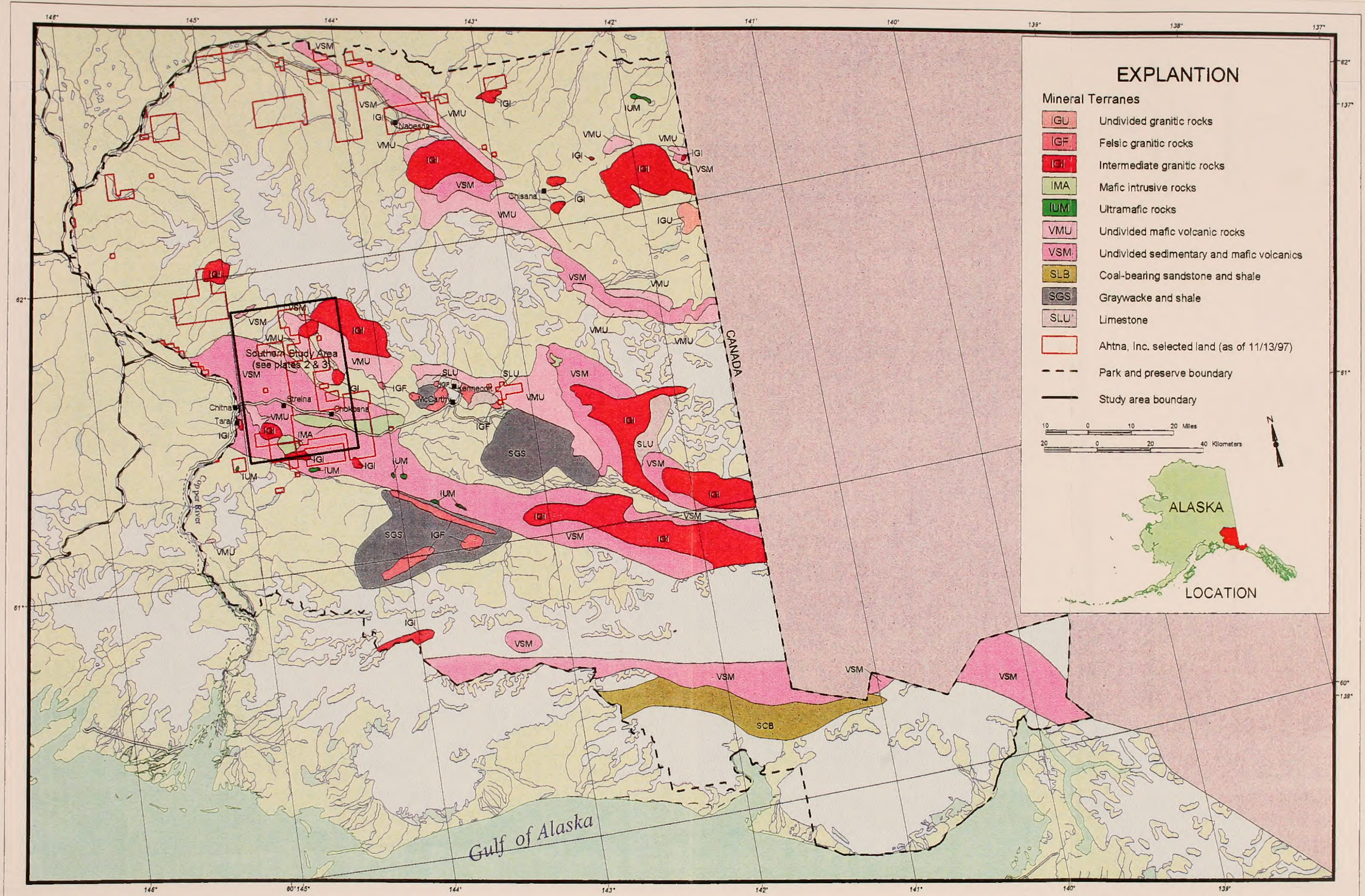

PLATE 1. - Location map of the Wrangell-St. Elias National Park and Preserve showing mineral terranes.

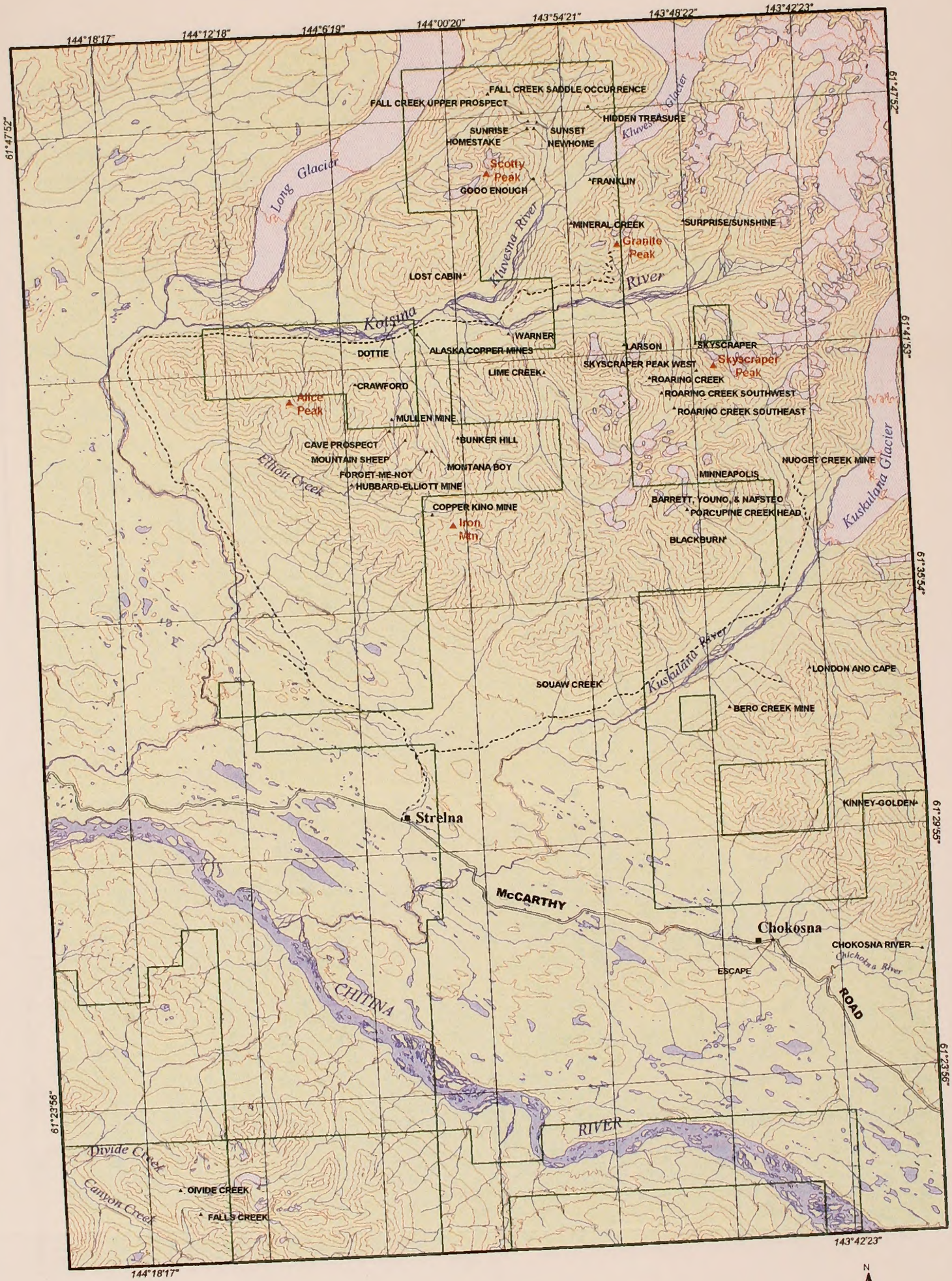

PLATE 2. - Property location map of the southern study area Wrangell-St. Elias National Park and Preserve.

EXPLANATION

- Property location
- Town / village
- Ahtna, Inc. selected lands (as of 11/13/97)

Roads

- Secondary road
- Trail

N

0.6 0 0.6 1.2 1.8 2.4 3.0 Miles

0.5 0 0.5 1 1.5 2 2.5 3 3.5 4 Kilometers

Contour interval 500 feet

LOCATION MAP

Base map adapted from USGS 1:63,360 scale quadrangles (Valdez B.C. D-1 & McCarthy B.C. D-8)

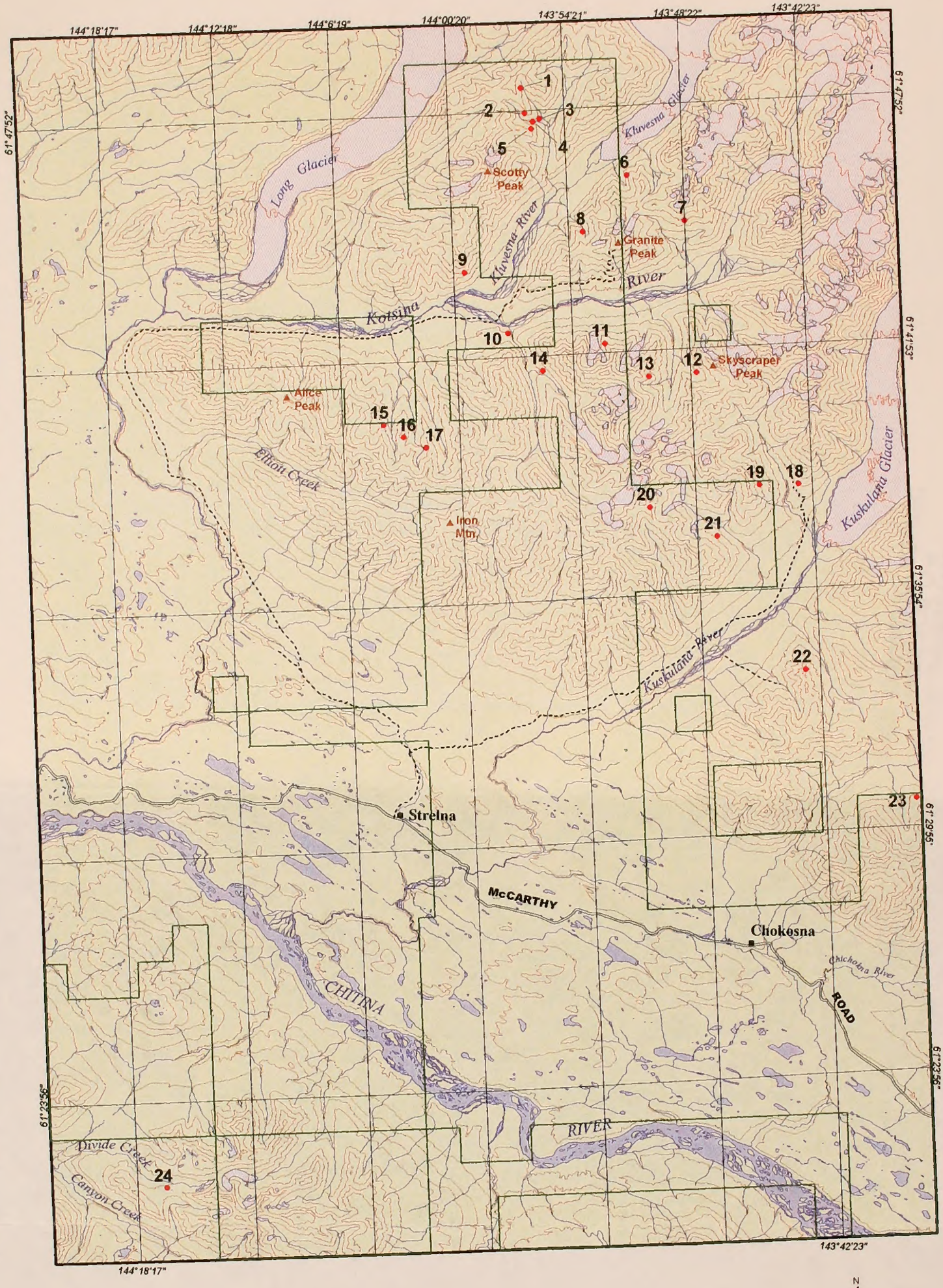

PLATE 3. - Sample location map of the southern study area Wrangell-St. Elias National Park and Preserve.

Base map adapted from USGS 1:63,360 scale quadrangles (Valdez B,C, D-1 & McCarthy B,C, D-6)